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July 1930

Electrical Manufacturing

Vol. 6 A Gage Publication No. 1

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✓ CHECK

Characteristics against those of any other Electric Heating Element

—Working temperature range up to 2750° F.
—Capacity up to 150 watts per sq. inch of radiating surface.
—Resistivity in ohms per centimeter cube .0936 to 1.95.
—Coefficient of expansion one-half that of iron.
—Positive temperature characteristic within working temperature range.
—Watt capacities can be varied within wide range.
—Ease of installation or replacement.
—Low initial and maintenance cost.

IT DOESN'T matter whether your problem calls for a tiny resistor to carry minute currents—like those used in Radio Receivers or whether you require an enormous electric heating element to dissipate as high as 50,000 watts from a single element for forging steel—there is a Globar product best suited to your needs.

We maintain a competent staff of engineers whose duty it is to assist you. Their services are offered without obligation.

GLOBAR CORPORATION
(A SUBSIDIARY OF THE CARBORUNDUM COMPANY)
NIAGARA FALLS, N. Y.

Pacific Abrasive Supply Co., San Francisco and Los Angeles
Williams & Wilson, Ltd., Montreal—Toronto, Canada
Steinmetz & Company, Philadelphia

(Globar is the registered trade name given to non-metallic electrical heating and resistance materials, and to other products of Globar Corporation, and is its exclusive property.)

TK1
.E362

A Vital Sales Feature for Electrical Appliances

The Plug Unbreakable for Things Electrical

EVERY modern electrical appliance should be equipped with the Belden Unbreakable Soft Rubber Plug. It saves replacement costs in the factory as well as in service. Users like it. It is popular with dealers. More than 195 manufacturers are already using this trouble-proof plug on their appliances.

An extensive program in the Saturday Evening Post is telling the story of the Belden Soft Rubber Plug to millions of appliance users and teaching them to look for the name Belden as assurance of relief from plug breakage.

Write for descriptive booklet and sample of the Belden Soft Rubber Plug. Give it every test. Like so many other aggressive manufacturers you will appreciate the sales value of this plug on your appliance when you see it.

Belden Manufacturing Company
4633 West Van Buren Street, Chicago, Ill.

The Belden Soft Rubber Plug is Standard Equipment on the following:

37 Washing Machines
35 Radio Units
24 Medical Equipments
22 Electrical Tools
8 Refrigerators
5 Paint Sprayers
9 Business Machines
3 Vacuum Cleaners
6 Floor Machines
3 Grinders
46 Miscellaneous Machines

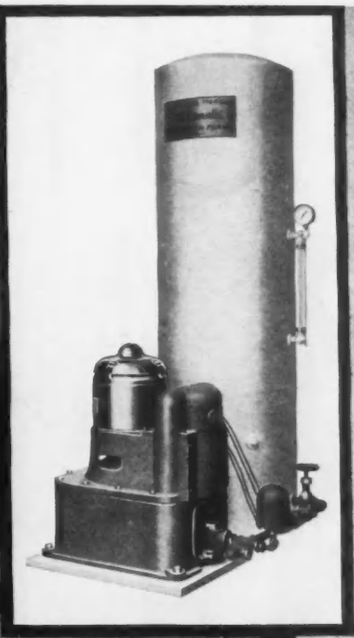
Belden
SOFT RUBBER PLUG

The Plug Unbreakable for Things Electrical

E.L.B. Jan. 30, 1933.

E.L.B. Jan. 30, 1933.

IN HARMONY
with the Form and Function of the Machine it Drives



It is a Master principle that the motor, whenever possible, should become an integral part of the machine. *Special problems* in motor application often give Master engineers the opportunity to make *extraordinary* contributions to the beauty, symmetry, compactness and safety of the complete device produced by a manufacturer. Efficiency has been increased and production costs lowered by inexpensive changes in the method of mounting or applying the motor. The above application is an example. Master engineers would welcome the opportunity to study such possibilities in connection with your product, without obligation to you.

THE MASTER ELECTRIC COMPANY
DAYTON, OHIO

STOCKS CARRIED IN PRINCIPAL CITIES

MORE THAN 100 SERVICE STATIONS

MASTER GUARANTEED MOTORS

1/20 TO 10 H.P. Dayton THE MASTER ELECTRIC CO. Ohio *Not More Than 40°*

PUNCHED *Insulating Parts*

PUNCHED insulating parts of all kinds can be produced promptly in quantity at the Formica plant. There is a large amount and variety of machinery available to serve you.

For 17 years the Formica organization has been specializing on just one product. It has attained a high quality uniform product; and an ability to do accurate work promptly and rapidly.

A stock that will meet any requirement is available. Send your blue prints for quotations.

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JUL 17 1930

Electrical Manufacturing

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Volume 6 JULY, 1930 Number 1

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ELECTRICAL MANUFACTURING'S editorial program has the following objectives:

Production

To help all electrical manufacturers, including makers of motor-driven products, increase the product's salability, cut unit production costs, quicken turnover, reduce overhead expenses, establish standard methods of work, and spread a better knowledge of raw materials and parts.

Marketing

To spread a better knowledge of and aid electrical manufacturers in adjusting sales management to the buyers' market, to aid in making advertising more effective, finding the most profitable distribution channels, and promoting cooperative market development.

Administration

To further the working out of sounder management policies and better executive control, coordinating sales and production schedules, promoting research, and developing better industry relations.

Repairing

To help all motor repair shops to build better business by developing a sounder organization, improving management, policies and methods, and developing a keener merchandising point-of-view on the business.

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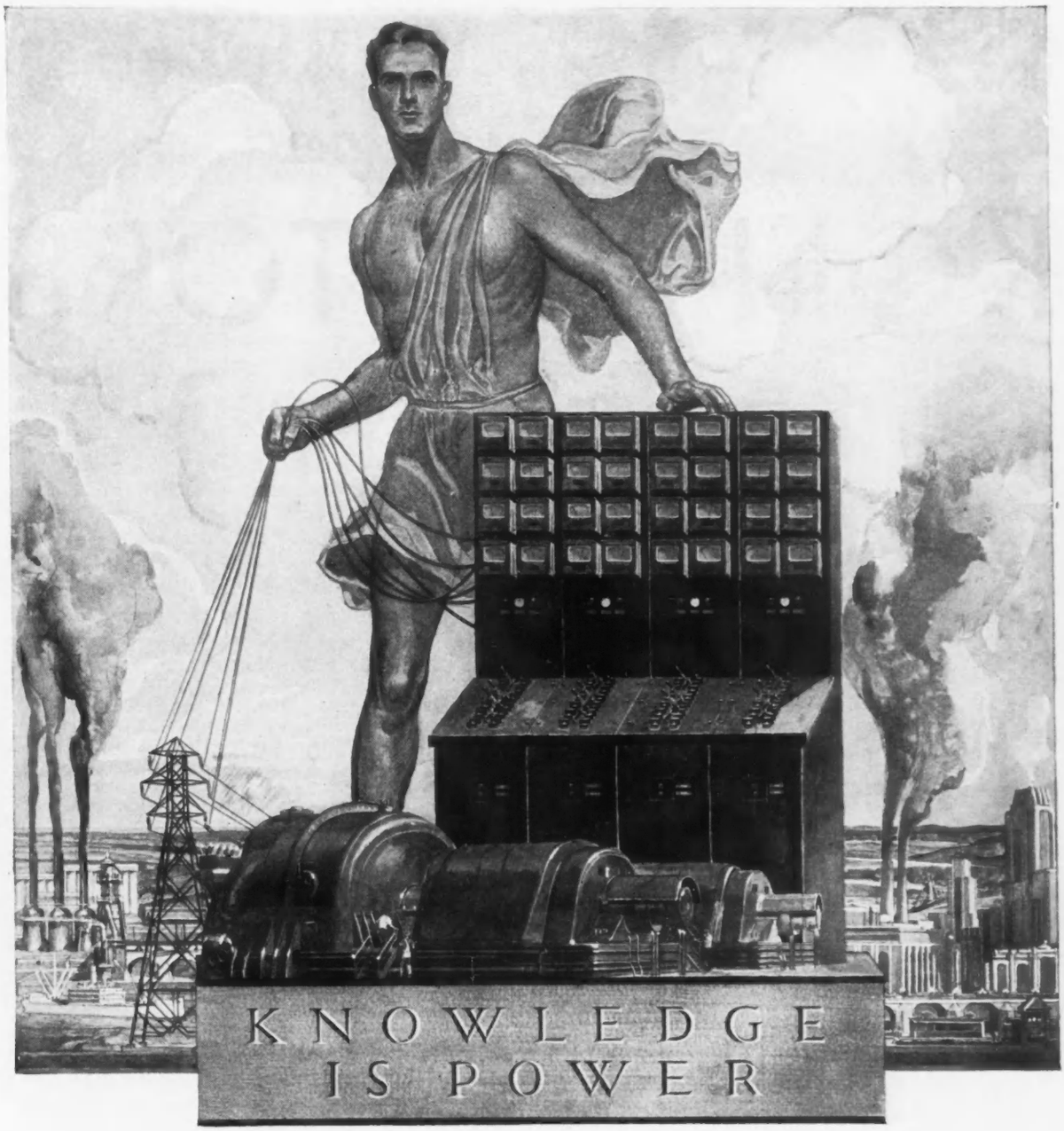

Holding in check the surging force of Electricity... keeping a taut rein on prime movers and power transmission, factory feeders and terminal equipment... controlling the myriad motors of industrial machinery... conserving the health, comfort and strength of millions of wage earners... safeguarding billions of national wealth... and aiding in scientific, social and economic advancement... "Westons" impart that exact knowledge of electrical conditions which transforms power to progress.

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582 Frelinghuysen Ave. Newark, N. J.

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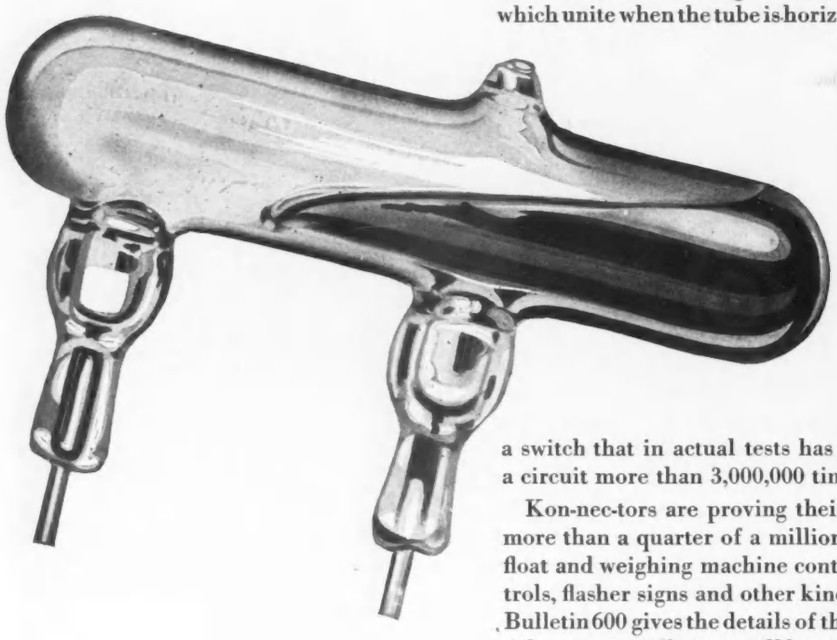
PIONEERS SINCE 1888
INSTRUMENTS

Makers Of The World's Highest Standards Of Quality Indicating Instruments.

Once installed you can forget KON-NEC-TORS —they're dependable

SIMPLE construction of the Kon-nec-tor is a guarantee of long, dependable life. Enclosed in a tube of special hard glass made to resist sudden shocks of great heat and cold, are two pools of mercury which unite when the tube is horizontal. A slight tilt and the mercury divides, thus breaking the contact. The two inleads of pure tungsten are always surrounded by mercury, thereby ensuring long and uniform operation.



The Kon-nec-tor is a trouble-free switch because there is expert knowledge and years of manufacturing care behind it. The General Electric Vapor Lamp Company has been making electro-mercury products since 1903. These 27 years of experience have made the Kon-nec-tor a switch that in actual tests has shown that it can open and close a circuit more than 3,000,000 times without attention.

Kon-nec-tors are proving their sturdiness and dependability in more than a quarter of a million installations. Among its uses are: float and weighing machine controls, toggle switches, pressure controls, flasher signs and other kinds of automatic electric apparatus. Bulletin 600 gives the details of the Kon-nec-tor and many other uses. Advice on installations will be given gladly by any of our engineers. General Electric Vapor Lamp Co., 883 Adams Street, Hoboken, N. J.

The hard glass tube of the Cooper Hewitt Kon-nec-tor is noted for its great mechanical strength and heat resistance. Alternate sudden heating and cooling through millions of times shows little deteriorating effect. Its low co-efficient of expansion is practically the same as that of the tungsten inleads sealed in the glass—which makes for compactness and sturdiness.

GENERAL ELECTRIC VAPOR LAMP COMPANY

(Formerly Cooper Hewitt Electric Company)

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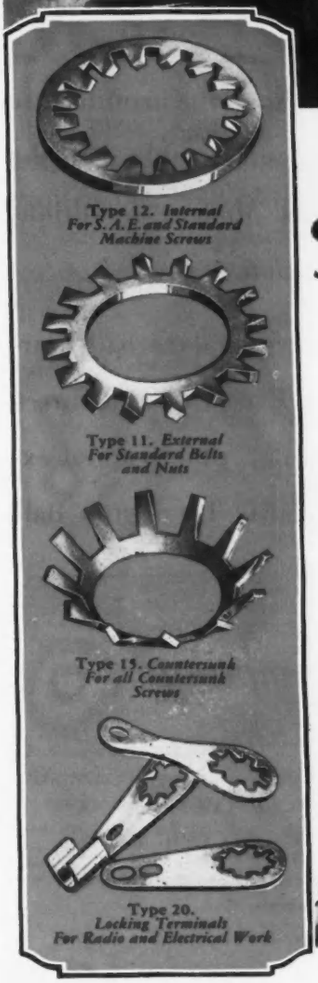
SHAKEPROOF


Type 12. Internal For S. A. E. and Standard Machine Screws
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Type 20. Locking Terminals For Radio and Electrical Work

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THE quickest way to prove the dependability of your product to any dealer or wholesaler is to proudly point to the fact that it is equipped throughout with Shakeproof Lock Washers.

The dealers know what Shakeproof means—many are using this positive locking method in all their service work. They know there is no reason for a nut or screw working loose for Shakeproof can hold it tight under the most intense vibration.

If you have never seen the multiple locking action of this modern lock washer send for free samples. Shakeproof Lock Washers do not spread and, due to their exclusive design, they cannot tangle. They will add to the life of your product and cut production costs, too. A trial will prove these facts—write for samples today!

Important
Be sure to read our advertisements appearing in this month's issues of Radio Retailing and Electrical Merchandising

U. S. Patents 1,419,564, 1,604,122 1,897,954 Other patents pending. Foreign patents.

"It's the Twisted Teeth that LOCK"

SHAKEPROOF
Lock Washer Company
(Division of Illinois Tool Works)
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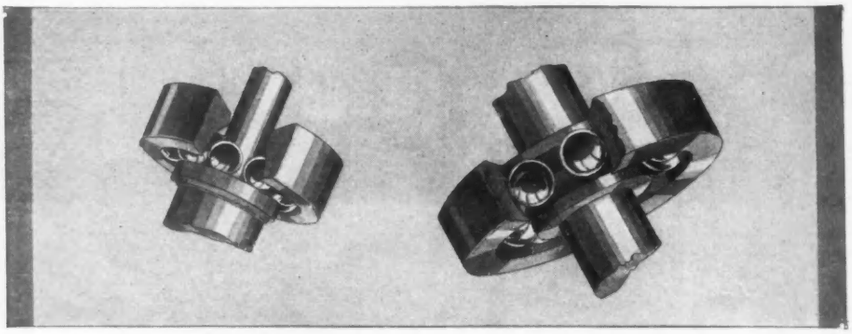
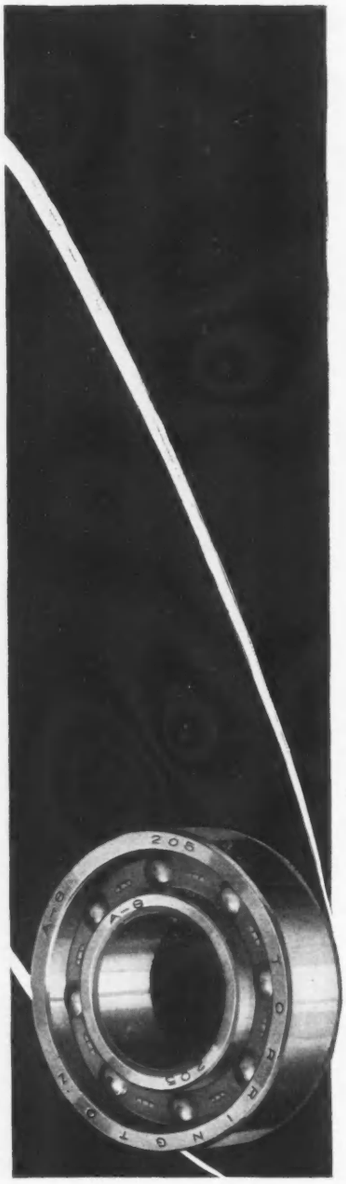
THE WORLD FIGHTS FRICTION





AN installation whose inventor termed it a ball bearing orientation made its appearance in 1857. The anti-friction qualities of ball bearings were utilized in a shaft installation. The ball bearing functioned in any direction that the shaft turned.

THE scientific skill and care lavished upon the manufacture of Torrington Ball Bearings compare favorably with the production of delicate watch movements. Modern conditions of machine operation demand this precision.

Torrington is peculiarly well equipped to produce ball bearings, the most efficient anti-friction device. Exceptional resources of skilled craftsmen and plant equipment . . . plus years of experience in precision manufacture . . . qualify Torrington Ball Bearings for long and satisfactory service.

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RIGID TESTS *Prove the quality of* Anaconda MAGNET WIRE

In the manufacture of Anaconda Magnet Wire, test follows test continuously from bare wire to finished spool. More than a score, both physical and electrical, prove Anaconda the standard of quality. Then before the wire is wrapped for shipment, a final test assures accuracy of gauge.

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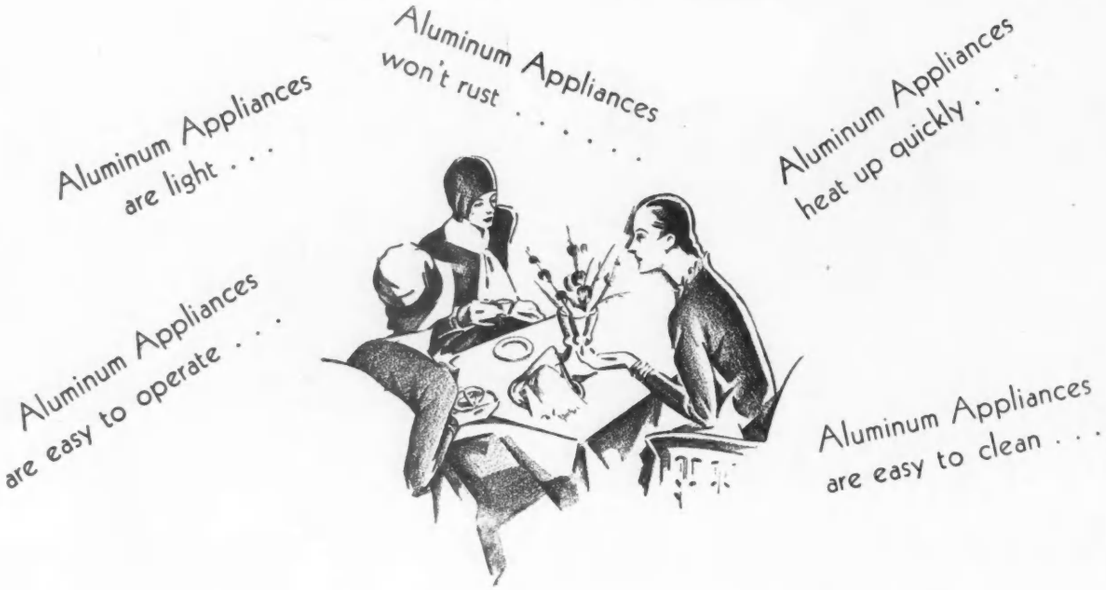
Anaconda safeguards quality from mine to consumer — provides a nation-wide service, prompt, dependable, complete.


Aluminum Appliances are light . . .
Aluminum Appliances won't rust . . . . . .
Aluminum Appliances heat up quickly . . .
Aluminum Appliances are easy to operate . . .
Aluminum Appliances are easy to clean . . .

One woman tells another, that's why electrical appliances made of Alcoa Aluminum sell quickly . . . .

Your sales, made and unmade by friendly talk over the bridge table—that's what is happening thousands of times a day.

Your modern housewife wants her home spic and span—wants to do her cooking and sewing in jig time. She won't spend unnecessary hours at these tasks. Nor does she like to use so-called labor saving devices that are made of heavy metals—that are, as she says "like a ton of bricks to move"; that get rusty and are hard to operate and keep clean.

In short, she wants every household device she buys to work simply, quickly, safely and well.

In selling electrical appliances made of Alcoa Aluminum a powerful "natural" force is at your disposal—*women everywhere know that aluminum is the light, bright, safe metal.* Take advantage of this "selling force" by building your appliances of Alcoa Aluminum —the metal that women know and prefer.

Alcoa Aluminum conducts heat rapidly. It is economical to fabricate because it can be cast to close tolerances and is easily machined. It takes a high, durable polish, without plating. ALUMINUM COMPANY *of* AMERICA; 2444 Oliver Building, PITTSBURGH, PENNSYLVANIA.

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ALCOA ALUMINUM

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HAS THE CALL!

Beauty and practicality...every woman wants these qualities in her home equipment... and chromium gives them to her. Chromium brightens the house and lightens the housework! It never needs polishing...its rich brilliance is never dulled by time or use. That's why chromium plated merchandise has the call.

United Chromium, Inc., renders a valuable licensing service which assures manufacturers of the finest chromium plate on a definite production basis. We would be glad to explain this service...or, if your needs do not warrant your own plating department, to send you a list of our jobbing licensees.

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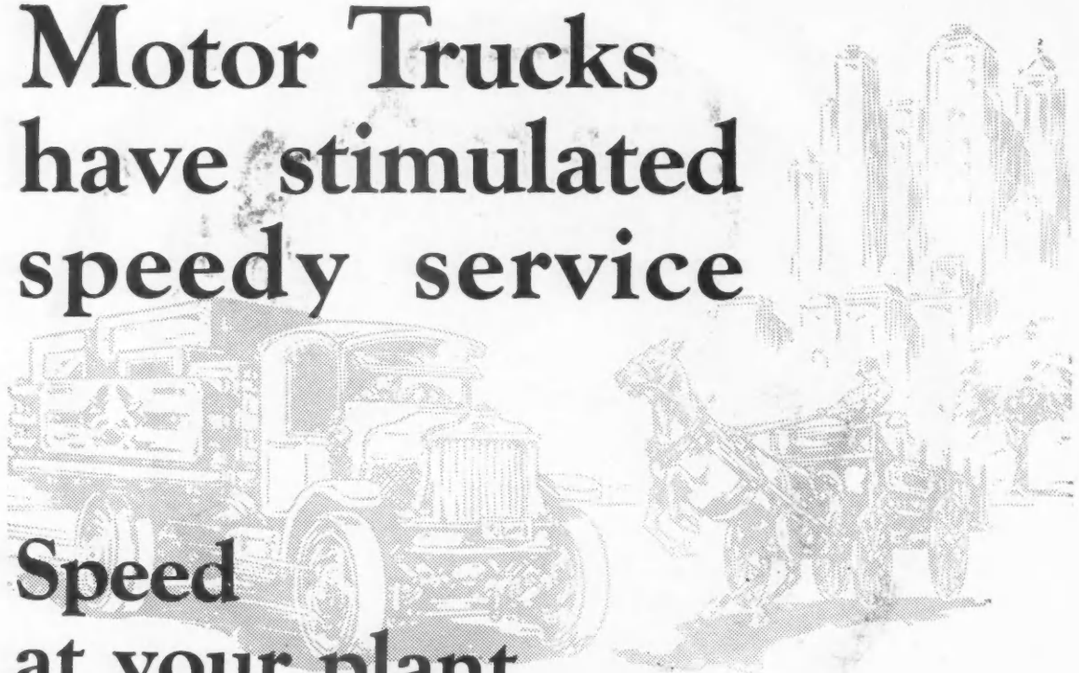
Detroit, Mich. ◆ *San Francisco, Calif.* ◆ *Waterbury, Conn.*

Motor Trucks have stimulated speedy service



Speed at your plant may need the stimulus of-

NEWTON NEW-HAVEN

Die Castings

— to gain the tremendous advantages of higher assembling speeds, absolute interchangeability and greater ultimate manufacturing economies.

THE NEWTON DIE CASTING CORPN.
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GREATER PROFITS
are the natural outcome of selecting acceptable, economical raw materials.

NDC-27

FITTING EVERY-DAY HOME UTILITIES *to the average housewife's pocketbook*

PRODUCTION economies brought about by Stewart Die-Casting measurably reduce costs, give added strength and finish.

Stewart engineers take a complicated machine tooled part, simplify its design, prescribe a test proof alloy, and apply the die-casting process. Aluminum ware, once sand-cast, is die-cast to an even thickness, possesses greater strength and finer finish. A complete vacuum cleaner housing is produced in two halves, measurably reducing its cost without sacrifice of quality.

Frequently one Stewart casting replaces an entire sub-assembly, so expert are Stewart specialists in the application of products to production as die-castings. Behind this process stands a complete staff of engineers, metallurgists, craftsmen, and modern machinery, ready to serve you.

A word from you brings a Stewart engineer to give personal attention in regard to your die-casting requirements, or why not send blue prints or samples for quotations today?

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Cleveland

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4500 Fullerton Avenue, Chicago, Illinois

Our new "Engineer's Die Casting Handbook" is now ready. It contains a brief, factual description of the die casting process in all of its modern developments. Write for your copy today.

What to do when business is slow

RIGHT now seasonal slumps are combined with inactivity in certain lines. We hope that isn't true in your business, but if it *is*—you have a real opportunity. When the plant is comparatively idle is the time to improve equipment, experiment with new processes, and improve your position so that when business picks up you will be on top of competition.

When you don't have rush work, experiments and rearrangements cost you nothing in production. The key men of your organization are still on the job—the people who help most in making any improvement in your product. Right now, when they are not straining to get the stuff out, is the best time to use their *brains!*

Now is the time for the broad view—the fresh and impartial scrutiny of every detail of your business. One of those details, and a very important one, is the *finish* you put on your product. Egyptian Lacquer is making a special point this summer of cooperating actively with manufacturers who seek better finishes, distinctive finishes, finishes that will put them far ahead of competition when business picks up. We're working for *future* business, and we'll get it only if *you* get ahead.

Just drop us a line—or call any of our branches on the phone. We know we can *help.*

THE EGYPTIAN LACQUER MFG. CO.
90 WEST STREET - NEW YORK CITY

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***The Maker Who is PROUD of What He Makes,* USES EGYPTIAN LACQUER**

The *direct* electrical approach to the men who specify, influence or approve

the final choice of equipment entering into electrical installations in every type of building. ELECTRICAL SPECIFICATIONS, as its name implies, concentrates on selling the electrical idea to these factors.

Architects, specifying electrical engineers, builders and electrical inspectors have a common eagerness to learn about better, approved electrical practice, and its interpretation into their planning and specifying.

ELECTRICAL SPECIFICATIONS is their primary authority, because of its exclusively *electrical* program, and because of its 38 year background of electrical industry service.

Here is a market worth cultivating, and a paper ideally fitted to carry an advertising message to it, with a minimum of waste. Details are available now for inclusion in Fall schedule planning.

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461 Eighth Avenue, New York, N. Y.
Publishers to the Electrical Industry Since 1892

ELECTRICAL SPECIFICATIONS

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ELECTRICAL INSTALLATION RECORD
ELECTRICAL SPECIFICATIONS
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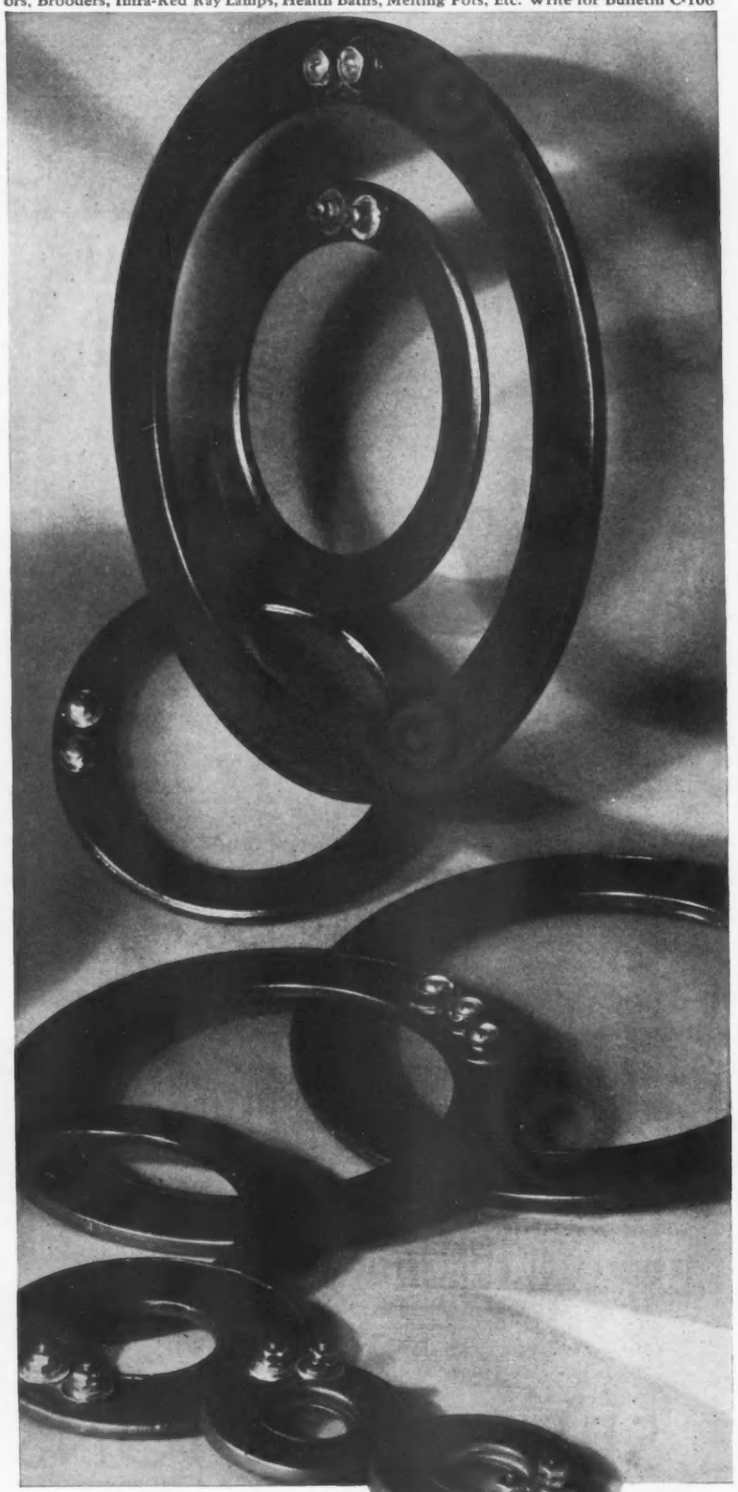
★Chromalox Ring Units, Single or 3-heat, 2½" to 11" diameter, 110 or 220 volts. Used by leading makers of Electric Ranges, Waffle Bakers, Coffee Urns, Percolators, Sandwich Toasters, Incubators, Brooders, Infra-Red Ray Lamps, Health Baths, Melting Pots, Etc. Write for Bulletin C-106



Make your products *trouble-free* . . . . . from the start

Over 173 far-sighted manufacturers are doing it Tests and experiments soon showed that it's more economical all around to equip products with patented Chromalox heating units.

IT'S like building an automobile . . . or a fine watch. The motor, the works, the insides must be right or it won't go. You are making appliances. Fine looking . . . latest designs . . . destined to be best-sellers.

The most important part of your product is out of sight

But what about the heating units that are out of sight and yet responsible for the every day successful operation of that waffle baker or electric range or water heater? Are they going to deliver the right heat everytime the switch is turned on?

Not a single burn-out in 5 years

That report just comes from an ironing machine manufacturer. It's his five-year experience with Chromalox heaters. Other companies report similar satisfactory operating records. Your own products can be made just as trouble-free by using these patented Chromalox units.

Start now to make your products trouble-free

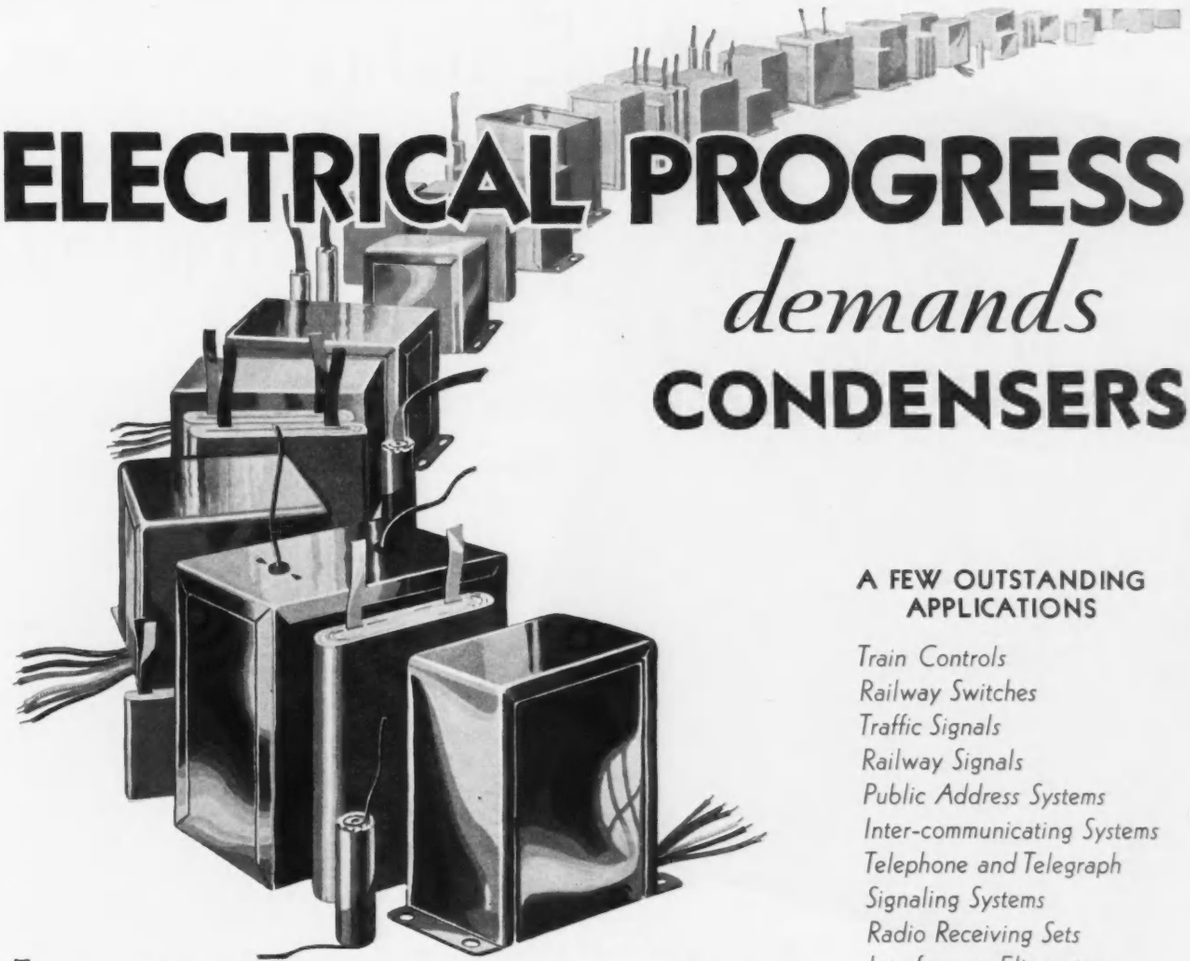
Customers call us in to show them the right way to build in the heating units. Result, assembly costs are lowered, trouble is side-tracked. Whether you are working on a new product or improving an old one, tell us about the appliances or heating devices you want properly heated. There's no obligation!

EDWIN L. WIEGAND CO.
7530 Thomas Blvd., . Pittsburgh, Pa.

★*Send for your copy of these 8-page bulletins showing the largest complete line of Strip Heaters, Ring Units, Immersion Heaters, High-Speed Range Units and Special Heaters.*

Chromalox
ELECTRIC HEATING UNITS

ELECTRICAL PROGRESS *demands* CONDENSERS



For power factor correction, spark absorption, and interference elimination, electrical condensers are indispensable factors in modern electrical engineering. Technically sound in both design and construction, FAST Condensers since 1919 have been the choice of the country's finest radio products. Specialized equipment and volume production make possible economies you should profit by, and FAST quality offers the dependability your product needs.

All the engineering experience of the Fast organization is at your command, and your inquiries are invited for fixed condensers of any capacity or voltage rating.

A FEW OUTSTANDING APPLICATIONS

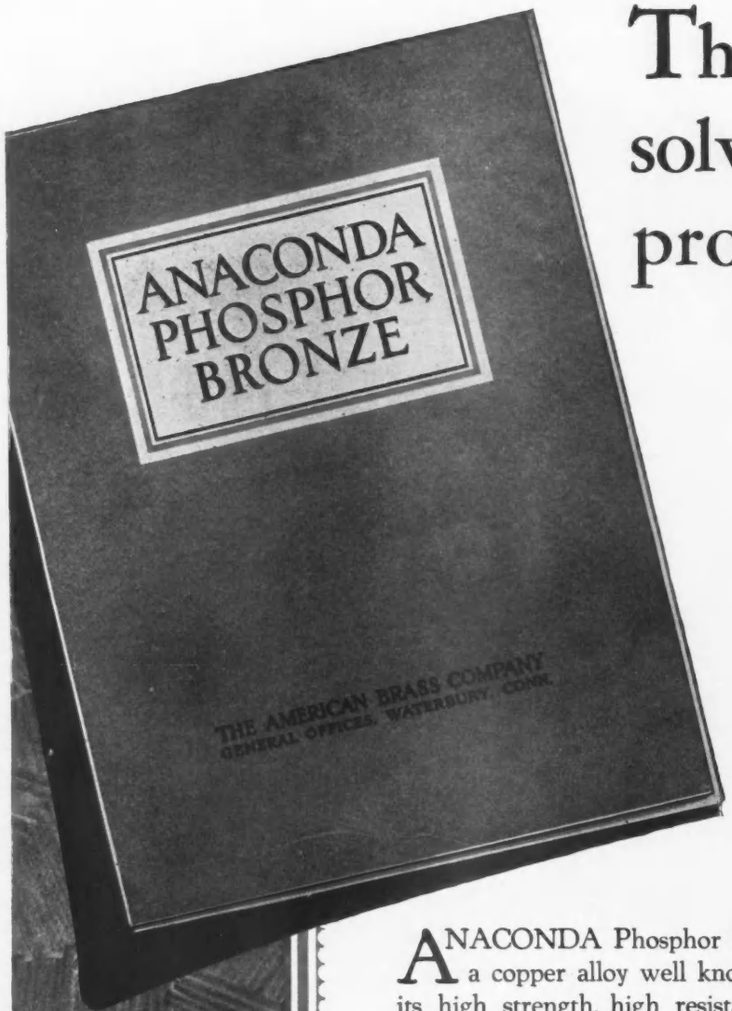
Train Controls
Railway Switches
Traffic Signals
Railway Signals
Public Address Systems
Inter-communicating Systems
Telephone and Telegraph
Signaling Systems
Radio Receiving Sets
Interference Eliminators
Electric Motors
Motor Equipment
Rectifiers
Engine Ignition
Sign Flashers
Controllers
Lightning Arresters
Automatic Switches
Relay Switches
Electrotherapy
Incubators
Measuring Instruments

FAST

Specialists in Radio Condensers

JOHN E. FAST & CO., 3123 N. Crawford Avenue, CHICAGO, ILL.

This booklet may solve a production problem for you



ANACONDA Phosphor Bronze, a copper alloy well known for its high strength, high resistance to fatigue and low coefficient of friction, is successfully used for a wide variety of spring and bearing purposes. It is made by The American Brass Company in four different grades, each specially alloyed to meet specific manufacturing requirements. For further information, write today for your copy of this new booklet, Publication B-15.

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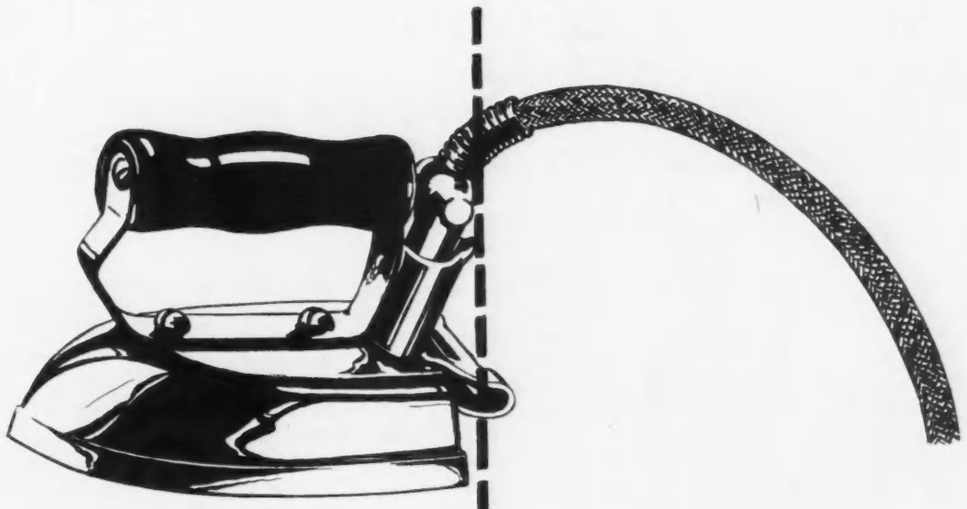
General Offices: Waterbury, Connecticut
Offices and Agencies in Principal Cities
Canadian Mill: Anaconda American Brass Ltd.,
New Toronto, Ontario

ANACONDA
COPPER ANACONDA BRASS



Which half should be *good?*

Both parts, of course.

And with any heating appliance, should the element be good and the heater cord poor?

Or should the cord be good and the element poor?

Or can the market stand for both element and cord being good?

DRIVER-HARRIS COMPANY
HARRISON, N.J.

Chicago-Detroit-Morristown, N. J. England-France
In Canada The B. Greening Wire Co., Ltd., Hamilton

Supplies the maker of heating devices with the best there is to make a *completely* good product:

Nichrome IV
High Temperature Service

+

Central Station Grade Heater Cord

SUMMON THE SPAULDING ENGINEER

From Your Nearest Spaulding Factory . . .

On All Problems Involving the Selection And Economical Use of Materials

WHEN the question arises, "What material shall we use here?" . . . When your superintendent complains of parts breakage . . . When inspection room reports show a high percentage of rejects . . . When customers and salesmen complain that some part is causing trouble . . .

Do what dozens of other manufacturers are doing. If there is the slightest chance that the use of vulcanized fibre or laminated Bakelite may correct the trouble, pick up your telephone, call the nearest Spaulding Factory, and ask them to send a Spaulding Engineer to see you.

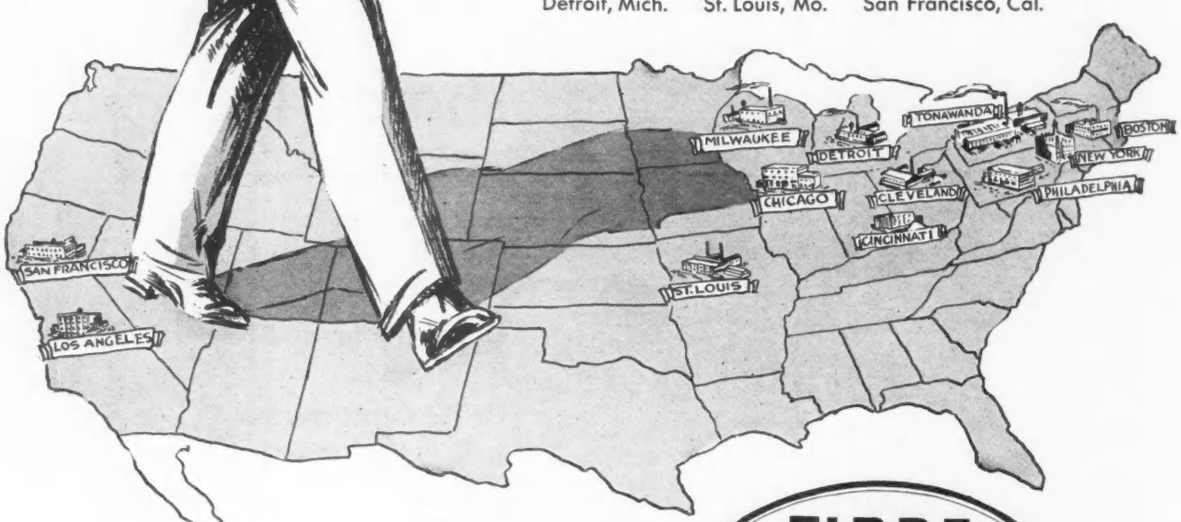
When he arrives, tell him your difficulty. He won't waste your time. Just let him roll up his sleeves and get right down to work. He will make a thorough study of the part or parts in question, and will quickly tell you whether any Spaulding material can be used to advantage. You can rely upon his opinion as being authoritative.

And you will find, as other manufacturers have found, that a Spaulding Engineer's primary interest is to help you. If in so doing, he finds a logical place for Spaulding Fibre, Spaulding-Bakelite or Spaulding Armite—then the benefit is mutual. His services are available for the asking. Call upon him once and you'll do so again.

SPAULDING FIBRE COMPANY, INC.

TONAWANDA, N. Y.

New York, N. Y. Chicago, Ill. Boston, Mass. Cleveland, Ohio
Milwaukee, Wis. Philadelphia, Pa. Cincinnati, Ohio Los Angeles, Cal.
Detroit, Mich. St. Louis, Mo. San Francisco, Cal.

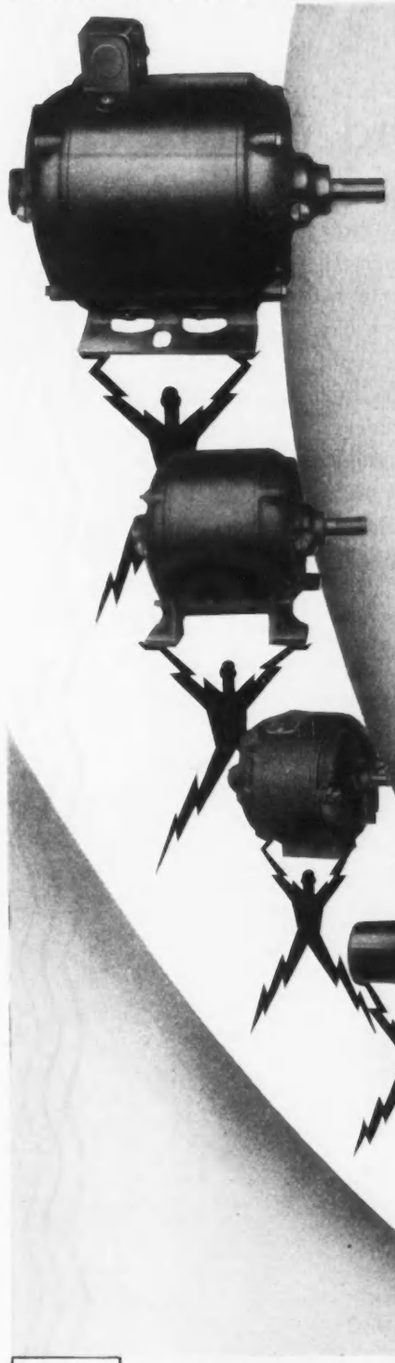


Spaulding

FIBRE
(GENUINE HARD VULCANIZED)
BAKELITE
(LAMINATED)
ARMITE
(THE IDEAL THIN INSULATION)

NORTH EAST

ELECTRIC MOTORS AND BLOWERS



ONE thing you can always count on in a North East Motor » » no matter how its design may be adapted to your particular need, it retains the fundamental requirement of lasting quality.

North East has abundant facilities for mastering your power problem. Whether the solution demands a modification of one of our standard types or some ingenious new design for a special purpose, here will be found the engineering skill to plan it, the craftsmanship and equipment to assure prompt and adequate production.

Like all products bearing the well known North East trade-mark, these motors are rugged, dependable and enduring. Their design embodies the best in modern electrical practice. Their power output is rated conservatively. Yet you'll find their cost moderate.

Motor sizes range from the smallest designs up to 1-8 H. P. and a variety of types and voltages are available. Blowers have capacities up to 125 cubic feet of air per minute » » they are specially adapted to heating and ventilating needs in the automotive, commercial and marine fields.

NORTH EAST APPLIANCE CORPORATION

ROCHESTER, N. Y., U. S. A.

Fans
for pullets, potentates and pæans

In going through our factory today you will see more kinds of electric fans than you probably knew existed. Fans in gangs of seven for controlling the temperature in giant brooders in which 100,000 chicks can be matured to plump frying pan size *at one time* with twice the speed of Nature! Enormous ceiling fans, five feet across, for the sweltering palaces of oriental potentates. Blower fans, the lungs of mighty organs that give voice to pæans of glorious music. Tiny fans for keeping your car warm in winter—decorative new style fans to harmonize with modern homes. Fans are a fine art here at Robbins & Myers. We have been building them these thirty years for every purpose under the sun that requires a draft of air. Indeed, you can not stump us by asking for a fan that blows both hot and cold, for we even build them to do that!

If you have a problem in electrical-motored machinery, come to Robbins & Myers. We offer you the facilities of a completely modern plant, and the experience of 32 years' precision manufacture in designing, building and applying electric motors, generators, fans, and electrical appliances

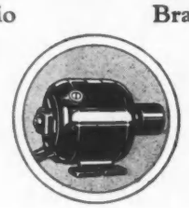
Partial List of Apparatus to which Robbins & Myers Motors have been successfully applied

Adding Machines
Advertising Displays
Air Compressors
Baker's Machinery
Blowers
Brick Machinery
Car Heaters
Churns
Cloth Cutters
Coffee Mills
Coin Counters
Confectioner's Machinery
Conveyors
Dental Lathes
Dish Washers
Driers
Elevators
Floor Surfacers
Folding Machines
Heaters
Heat Regulators
Hoists
Humidifiers
Ironing Machines
Labeling Machines
Oil Burners
Office Appliances
Organ Blowers
Mailing Machines
Machine Tools
Meat Choppers
Milking Machines
Movie Projectors
Phonographs
Portable Tools
Printing Presses
Pumps
Radio Stations and Receiving Sets
Spray Equipment
Ticket Selling Machines
Vacuum Cleaners
Ventilating Fans
Unit Heaters
Washing Machines
Wrapping Machines

Robbins & Myers, Inc.

Springfield, Ohio **Brantford, Ontario**

1878



1930

MOTORS, FANS, HAND AND ELECTRIC HOISTS AND CRANES

Beginning with the JULY issue

ELECTRICAL RECORD

became a specific installation paper for all engaged in wiring

In industry and among business papers, the tendency is toward functional specialization. In keeping with this trend, ELECTRICAL RECORD becomes the specific type of publication, by function and by name, as it enters upon its thirty-ninth year.

With the addition of the interpretative word, its title will precisely express the purpose of the publication, its field of operations and the scope of its activities.

The constant changes in general wiring practice and the ever-multiplying new uses for electrical energy, demand an enlarged editorial service dealing with the installation problems incident to these developments.

Having always given editorial predominance to installation or wiring activities, the industry's oldest monthly will henceforth concentrate wholly upon them.

ELECTRICAL INSTALLATION RECORD will reach, cultivate and influence the thinking of those engaged in electrical installation activities, and their suppliers.

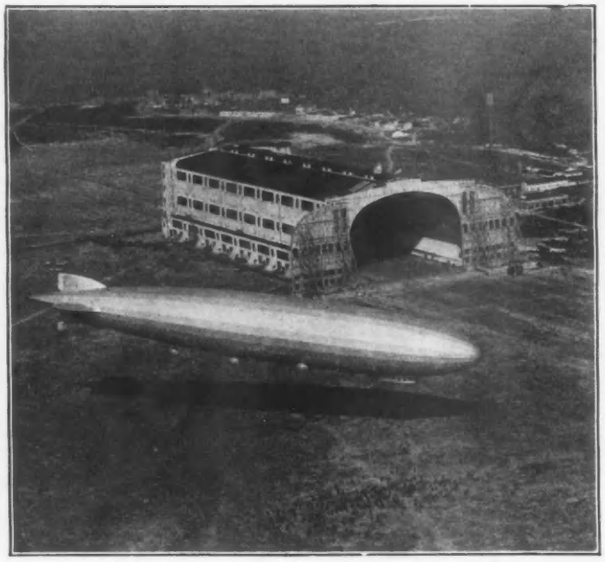
A.B.C. A.B.P.

Electrical Installation Record

THE GAGE PUBLISHING COMPANY, INC.
461 Eighth Avenue, New York, N. Y.

Publishers to the Electrical Industry Since 1892

ELECTRICAL SPECIFICATIONS
ELECTRICAL INSTALLATION RECORD
ELECTRICAL MANUFACTURING
METROPOLITAN ELECTRICAL NEWS
GAGE ELECTRICAL RETAILERS ENCYCLOPEDIA



Do Away With THE FIRE HAZARD!

AMBLER ASBESTOS PRODUCTS

Fireproof Ambler Asbestos Shingles.

Ambler Asbestos Corrugated Roofing and Siding.

Ambler Ebonized Asbestos, special sheet material of high dielectric and physical strength for electrical uses.

Ambler Asbestos Lumber, for barriers, cell compartments, ovens, fume hoods, etc.

Ambler Linabestos, for interior or exterior sheathing.

Ambler Asbestos Waltile, decorative wainscoting material finished in colors.

When you build, *do away with the fire hazard.* Side all-metal framework with Ambler Asbestos Corrugated Sheathing. That's the way the Navy Department built the big hangar at Lakehurst.

Roof with Ambler Asbestos Shingles or with Ambler Asbestos Corrugated Roofing. The result is a building that is weatherproof as well as fireproof; that resists the action of salt air, fumes and gases; that is extremely durable and erected at comparatively low cost. This is the ideal construction for public utility and manufacturers' warehouses, storage sheds, factory and various other buildings.

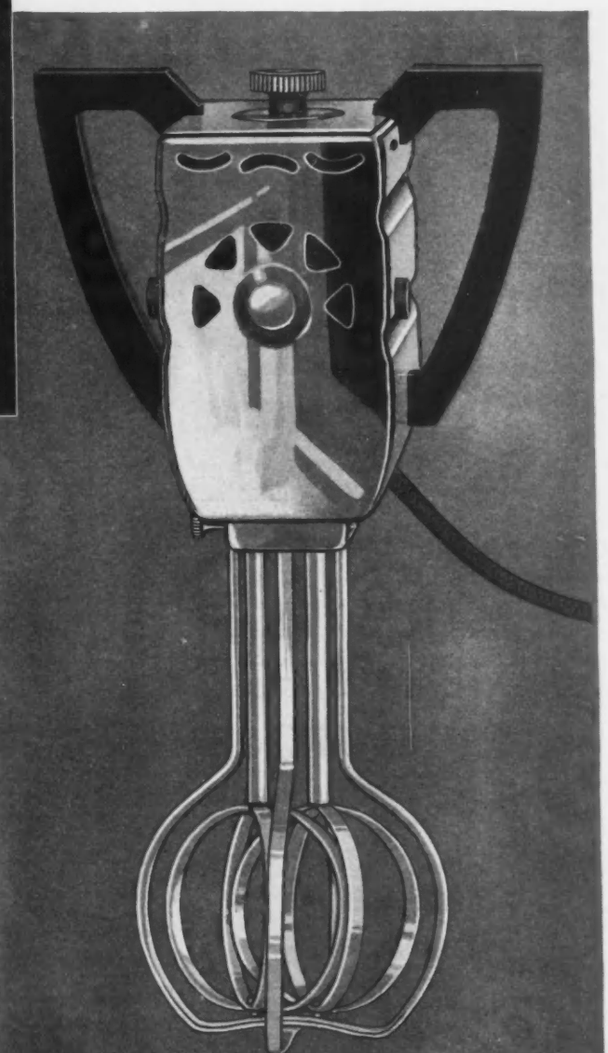
Ambler Asbestos Corrugated Sheets are made in 42-in. width and 4-ft., 5-ft., 6-ft., 7-ft., 8-ft. and 8-ft. 6-in. lengths. Weight is approximately 3¾ lbs. per sq. ft. Ridges and valleys of the corrugations are 11/32 in. thick and at the center of the slope the thickness is 9/32 in.

Our corrugated catalog contains engineers' data sheets that will assist executives contemplating new buildings, warehouses, and airports. *Write for a copy.*

Ambler Asbestos Shingle & Sheathing Co.

Ambler, Pa. St. Louis, Mo.

SMOOTH STEADY POWER for the Dormeyer Electric Food Mixer Dumore-Equipped!



THE Dormeyer Electric Food Mixer is a real time-and-labor-saving device. It makes food preparation, cooking, and baking a new pleasure . . . Of Dumore performance in this welcome household unit, the A. F. Dormeyer Manufacturing Company, says,

"The special Dormeyer motor has excess power. It will readily mix cake batters, mash potatoes, cream sugar, and other similar mixtures. It is a delight to see it take care of these tasks without apparent effort and in a fraction of the time they can be done by hand."

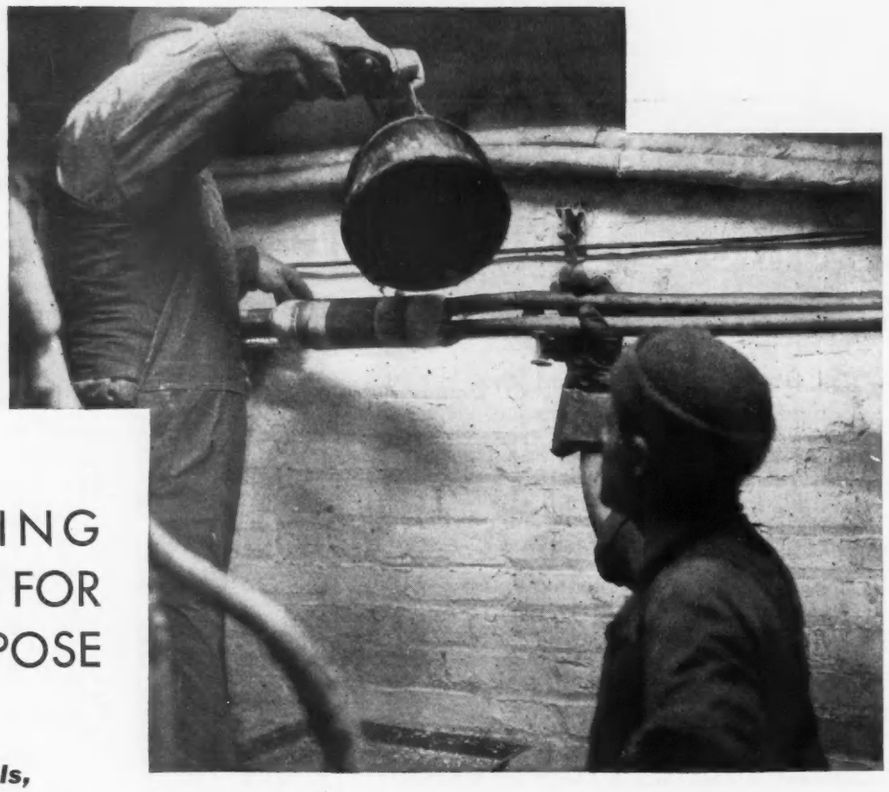
The great number of features built into Dumore Motors make them adaptable to anything requiring fractional horsepower driving energy. They are completely dependable, long-lived, and economical . . .

Write for Dumore Motor Details.

THE DUMORE COMPANY
35 Sixteenth Street Racine, Wisconsin

DUMORE
FRACTIONAL HORSEPOWER
MOTORS

G-E INSULATING COMPOUNDS SEAL TROUBLES OUT



INSULATING MATERIALS FOR EVERY PURPOSE

Varnishes, Oils, Shellacs, Paints

Filling and Sealing Compounds

Varnished Cloths and Tapes

Insulating Papers

Core Solder and Fluxes

Cords and Twines

Moisture and air are enemies of every joint in any electrical system. You can seal them out *permanently* with G-E Insulating Compounds.

These compounds are flexible . . . they withstand vibration without opening the slightest crack. Long General Electric experience has gone into their production. You can trust them under *any* condition *anywhere*

There's a General Electric Insulating Compound . . . tested and proved . . . for every sealing and filling use—on joints, potheads, coils, commutators, cables, etc.

You can get them *quickly* from G-E Merchandise Distributors in nearly every city—or write Section M-327 Merchandise Department, General Electric Company, Bridgeport, Conn.

GENERAL ELECTRIC

INSULATING MATERIALS

MERCHANDISE DEPARTMENT · GENERAL ELECTRIC COMPANY · BRIDGEPORT, CONNECTICUT

If you make ELECTRONIC TUBES or if you plan to make them . . . read these facts about DUREZ!

No MANUFACTURER of radio bases and parts, no concern which plans to make electronic apparatus and devices, no person who is following closely the new and diverse applications of the electronic tube, can afford to overlook Durez, the perfect molding compound!

For years, Durez has been used successfully in millions of pieces of radio equipment. Tube bases and sockets . . . panels and condenser sets . . . variometers and dials . . . all have worked more silently, smoothly, efficiently with the help of Durez. Now, with chemists and physicists daily uncovering new applications and uses for the revolutionary electronic tube, the possibilities for Durez in this field are greater than they have ever been before!

Durez goes to the molder in powdery, dust-like form. Tremendous pressure is applied. In a matter of seconds, the part comes from the mold, *finished!*

Parts made from Durez are strong, tough, light

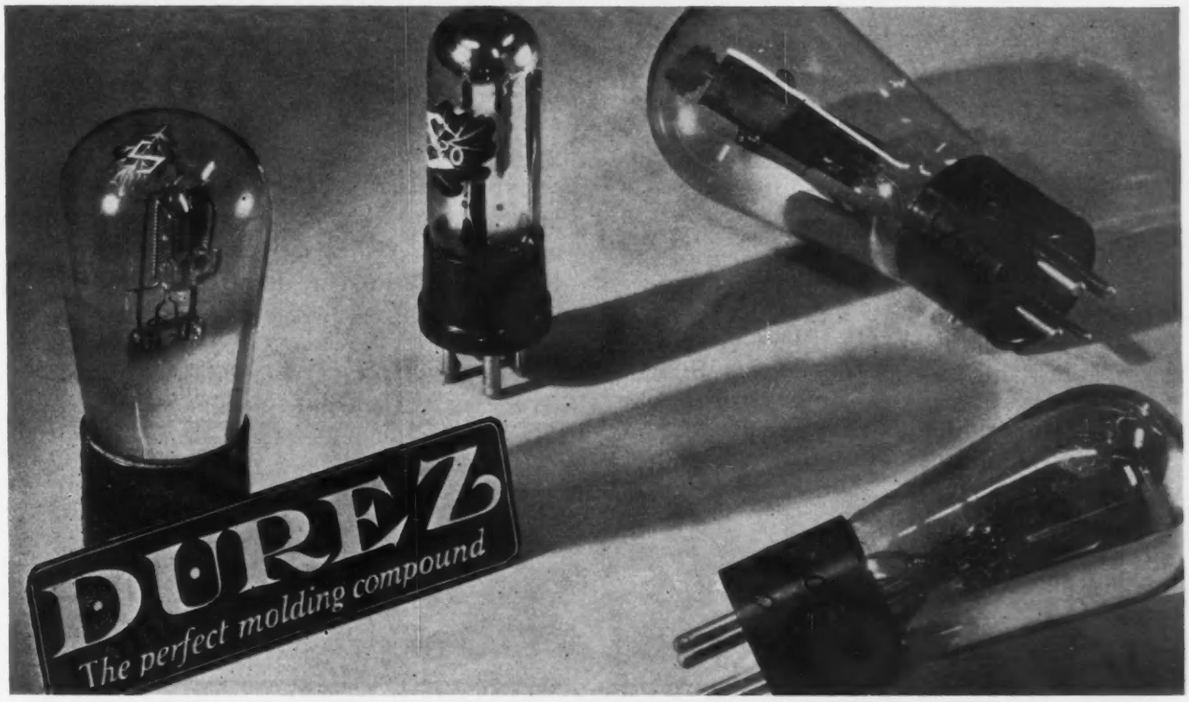
Resistant to acids, moisture, gases, perspiration. Tube bases hold their shape. The high mechanical strength of this amazing material makes very thin sections possible, permitting the extensive use of holes, slots and metal inserts — all cared for in the one molding operation! . . . Durez will not cold-flow.

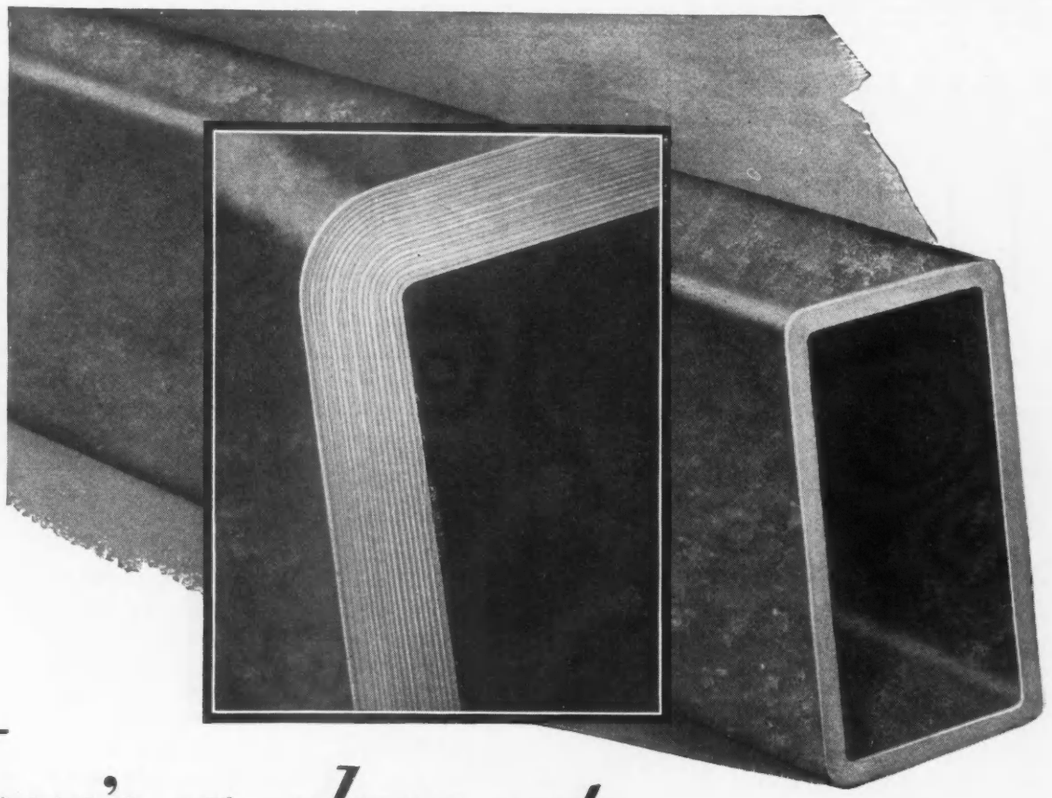
Although tooling, polishing and burnishing are unnecessary, the finish on Durez molded parts is always smooth and even. You can choose from a wide variety of beautiful colors. . . . Each Durez-molded piece is an exact duplication of every other! Precision can be held within closest commercial limits, resulting in definite savings on machining operations.

Let us tell you more about Durez

Durez is continually replacing wood, metal, porcelain, ivory, hard rubber and other materials. Let us show you how it can make *your* product better, more efficient, more durable. Our engineering staff is ready to give you full information on the practicability of using this extraordinary raw material in your business, or in making something you use. *Write for free booklet to General Plastics, Inc., 79 E. Walck Rd., N. Tonawanda, N. Y. Also New York, Chicago, San Francisco, Los Angeles.*

THE MAKERS OF DUREZ ARE ALSO THE MAKERS OF DUREZ INSULATING VARNISH





Here's a close-up

that explains the uniform, high dielectric strength!

Layer upon layer, the thin Super-Micanite sheet is wound to produce a conduit of unvarying resistivity. There are no seams, for long lengths of Super-Micanite are readily produced. Note how evenly and compactly the corners are layered—how uniform thickness is maintained throughout.

Such workmanship is typical of the thousands of forms of Super-Micanite. Skill and the finest of manufacturing facilities go hand-in-hand to produce, of Super-Micanite, insulators that are truly outstanding in their electrical and physical characteristics.

Add to this the fact that Super-Micanite has higher dielectric strength . . . less surface leakage . . . greater chemical and physical resistance . . . and is denser. Small wonder that more and more electrical manufacturers and repairmen are standardizing on Super-Micanite. Catalog 87 describes this electrical insulation in detail. Write for a copy.

MICA INSULATOR COMPANY

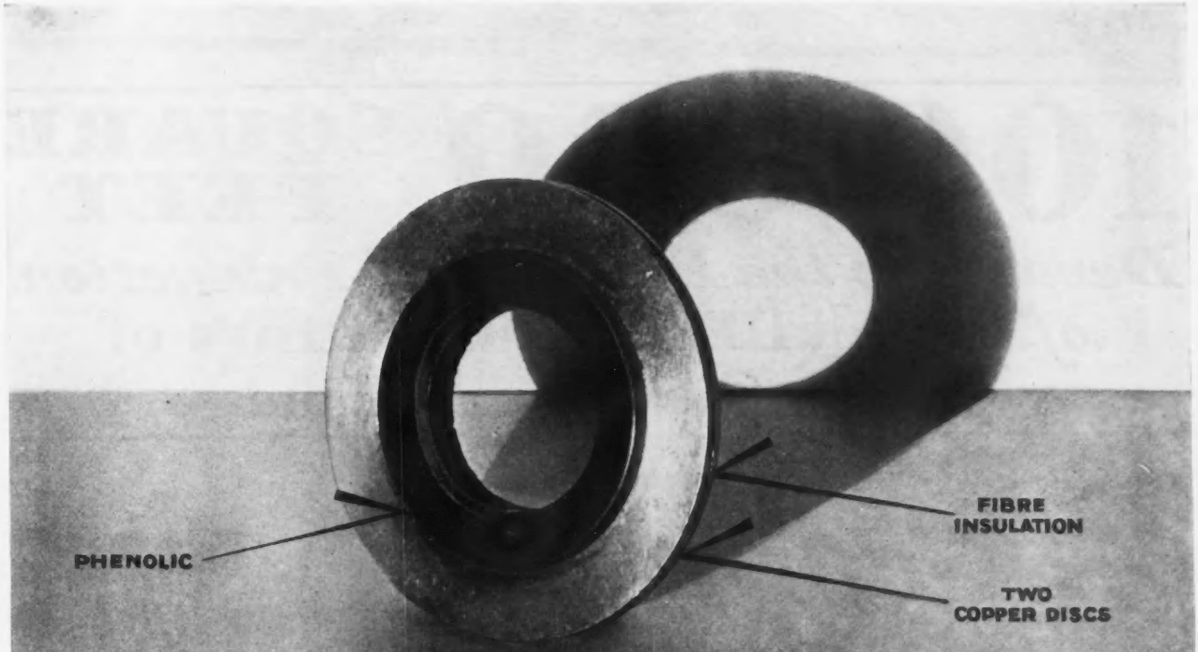
New York: 200 Varick St. Chicago: 542 So. Dearborn St.
Cleveland Pittsburgh Cincinnati San Francisco Seattle
Birmingham Los Angeles Montreal and Toronto, Canada
Works: Schenectady, N. Y. London, England

PERFECT MICANITE INSULATOR
REG. U.S. PAT. OFF.

Electrical INSULATION

PERFECT EMPIRE INSULATOR
REG. U.S. PAT. OFF

MICA INSULATION OILED CLOTH INSULATION



. . . one of those jobs that just "couldn't be done" . . .

A manufacturer of automatic starting switches had been told, and was nearly convinced, that this job was next to "impossible."

The problem involved the binding together, with Phenolic, two copper discs with fibre insulation between.

Bringing our experience with "can't-be-done" moulding jobs into play, we solved that problem economically and ***finally***. True, it was a "tricky" job—in the process of moulding together, we had to keep the Phenolic from getting in between the copper discs.

It is in such moulding jobs as this that our organization has proven its worth—all industry having come to us for half-a-century for mouldings that ***must be right.***

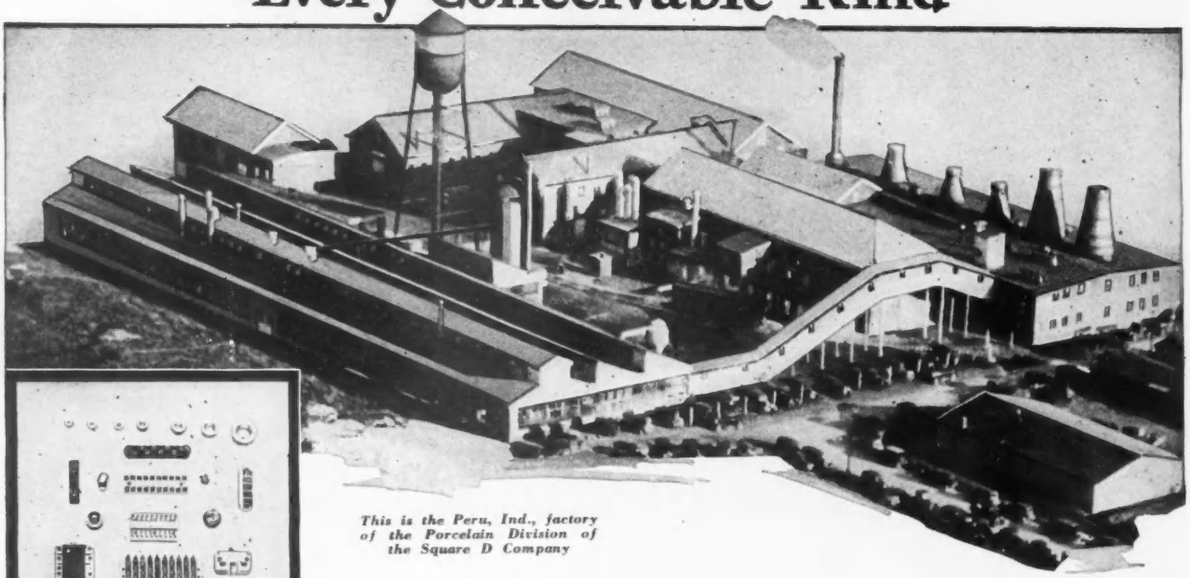
American Record Corporation

Principal Offices and Plant—Scranton, Penna.

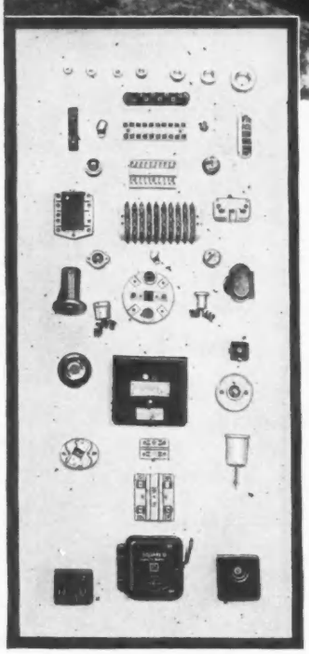
NEW YORK 50 Union Sq. | DETROIT 145 Eastlawn Ave. | CLEVELAND 4900 Euclid Bldg. | CHICAGO 645 Washington Blvd.

100,000 SQUARE FEET

Devoted to the Design and Production of Special Electrical Fittings of Every Conceivable Kind



This is the Peru, Ind., factory of the Porcelain Division of the Square D Company



A partial showing of the many complete electrical fittings made to special order for manufacturers of a great variety of products.

At the Peru, Indiana, plant of the Square D Company, a valuable service is being rendered to industry. Special electrical fittings that are integral parts of the products of leading manufacturers—and which these manufacturers are not equipped to make for themselves—are produced, *complete in every detail,* by Square D at Peru.

In many cases these special units are warehoused at Peru and shipped direct to consumers, as ordered by manufacturers for whom the units are made.

Square D's Peru plant is *complete.* Of its 100,000 square feet of floor space, 60,000 are devoted to the manufacture of a huge variety of electrical porcelain products—and 40,000 square feet are occupied by a thoroughly modern machine shop, laboratory, assembly room and storeroom.

These complete facilities—twenty-eight years of experience—and the engineering genius of Square D—are *yours* to command.

SQUARE D COMPANY, DETROIT, U. S. A.

Factories at: Detroit, Mich., Peru, Ind., and Milwaukee, Wis.

SQUARE D COMPANY, LTD., CANADA, WALKERVILLE, ONTARIO

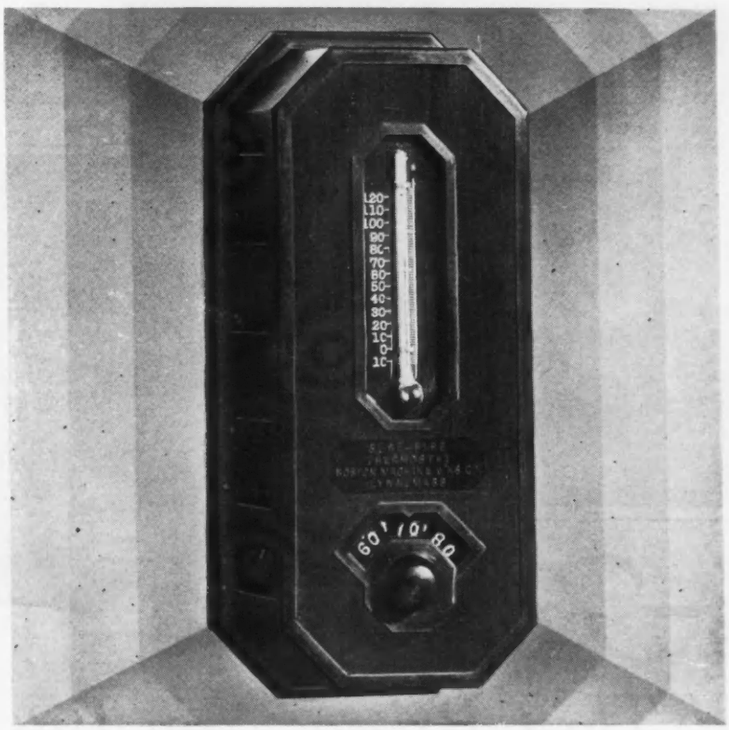
BRANCH OFFICES: Toronto, Montreal (160)

BRANCH OFFICES

Atlanta	Dallas	Kansas City	Pittsburgh
Baltimore	Davenport	Little Rock	Portland
Boston	Denver	Los Angeles	Richmond
Buffalo	Detroit	Milwaukee	San Francisco
Chicago	Grand Rapids	Minneapolis	Seattle
Cincinnati	Houston	New York	St. Louis
Cleveland	Indianapolis	Philadelphia	Syracuse

SQUARE D

INSULATION **PRODUCTS**



Sure-Fire Electric Thermostat with case of Bakelite Molded. Made by Boston Machine Works Co., Lynn, Mass.

PRODUCING THIS ATTRACTIVE CASE REQUIRES ONLY ONE PRESS OPERATION

Notwithstanding the refinement of design, and fine detail of this thermostat case, and the fact that it is a shell 1½ inches deep, it is successfully formed of Bakelite Molded in one press operation.

It comes from the mold, octo-rectangular in shape, with a ribbed face and smooth lustrous sides, openings for the thermometer and temperature setting, and clear relief lettering. In the mold, too, the case is given a beautiful mahogany finish which is a valuable selling point, since it harmonizes with the usual fittings of a modern house.

Bakelite Molded is responsible not only for the attractive appearance and simple production of this case, but also for high insulating value, desirable in an electrical instrument of this kind. Write for Booklet 52-M, "Bakelite Molded."

Bakelite Engineering Service—We manufacture a wide variety of phenol resinoid molding materials, varnishes, lacquers, enamels, cements, and other products. Twenty years experience in the development of these materials for electrical and other uses, provides a valuable background for the cooperation offered by our engineers and laboratories.

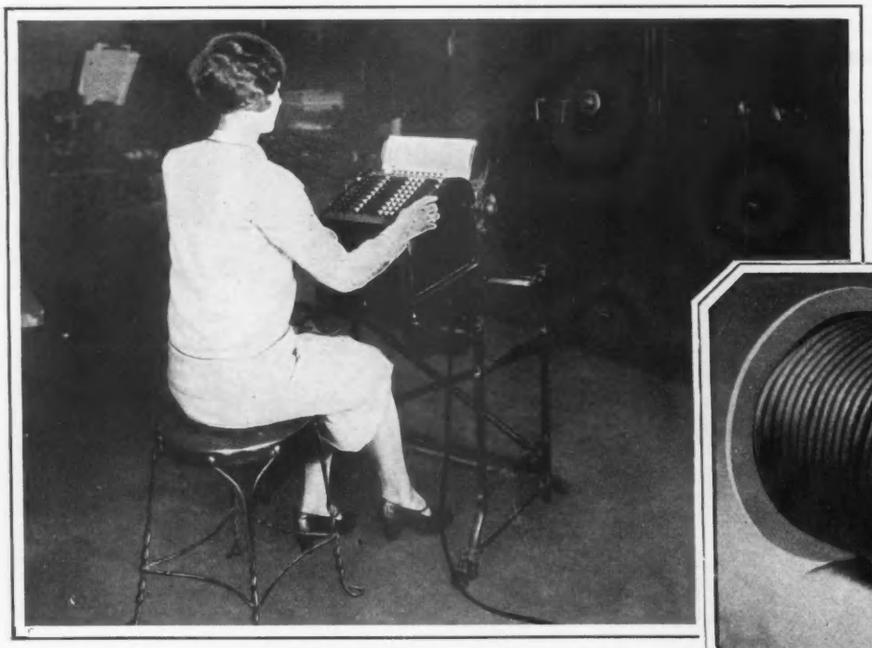
BAKELITE CORPORATION, 247 Park Avenue, New York. CHICAGO OFFICE, 635 West 22nd Street
BAKELITE CORPORATION OF CANADA, LIMITED, 163 Dufferin Street, Toronto, Ontario

BAKELITE

REGISTERED U. S. PAT. OFF.

"The registered Trade Mark and Symbol shown may be used only on products made from materials manufactured by Bakelite Corporation. Under the coined word "Bakelite" is the numerical sign for infinity, or unlimited quantity. It symbolizes the infinite number of present and future uses of Bakelite Corporation's products."

THE MATERIAL OF A THOUSAND USES

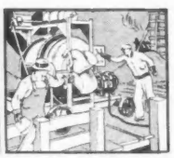


GE-Flex . . . . .

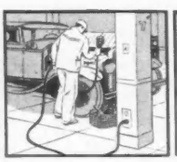
The Cord That Brings You Business

Lighting

Household Appliances


Construction Machinery

Electric Drills


Garages

Offices

Washing Machines

Vacuum Cleaners

In an office there's nobody to service motor-driven appliances. They *must* stand always ready. Repeat sales depend upon it. Are you giving your product the benefit of such dependable equipment as GE-Flex All-Rubber Cord? It means more business for you.

GE-Flex All Rubber Cord is good for long, hard service. This is why: its superior rubber jacket resists water, oil, heat, acids and mop suds. It can be stepped on or run over by the rollers of other machines. It doesn't kink or crack open.

It adds a degree of General Electric dependability to all sorts of electric tools and appliances indoors and out.

In cord sets—with non-breakable rubber plug—or on spools. Find out how GE-Flex All-Rubber Cord can help *you* build business. Please use the coupon today.

Section W-327, Merchandise Department
General Electric Company,
Bridgeport, Connecticut.

Send me complete information about GE-Flex All Rubber Cord.

Name.....

Address.....

.....

GENERAL ELECTRIC

MERCHANDISE DEPARTMENT · GENERAL ELECTRIC COMPANY · BRIDGEPORT, CONN.

© CI B 79126

Electrical Manufacturing

Production - Marketing - Administration - Repairing

Volume 6 JULY-1930 Number 1

Distilled Out of The Tariff Act

How 76 electrical materials fare under the new tariff act as compared with the old schedules

THE HAWLEY-SMOOT Tariff Bill, which after having been 18 months in the formative stage, became a law on June 17, provides changed rates of duty for many raw materials and parts used in the electrical industry as well as for electrical machinery and domestic appliances. As in the case of previous Tariff laws, many of the provisions of the Hawley-Smoot measure, known as "The Tariff Act of 1930," await interpretation in the Customs Court, which has been transferred from the Treasury Department to that of the Attorney General.

The flexible provisions of the new Tariff Act, not materially different from those in the 1922 law, are looked for to result in many more applications for changes in rates than was the case under the old law. Although the Act is not yet a month old, the Tariff Commission has already under way a score of investigations into foreign and domestic costs of various commodities. When former Tariff laws were once on the statute books, manufacturers and importers forgot the subject until the time came for fresh legislation, whereas with the flexible provisions of the Hawley-Smoot Act expected to be constantly alive, manufacturers and importers are obliged to maintain a constant watch on Tariff developments and decisions.

In the following are presented the most important changes in the Tariff schedules for raw materials, parts and electrical products. Rates which remain unaltered have not been included in this compilation:

Raw Materials and Parts

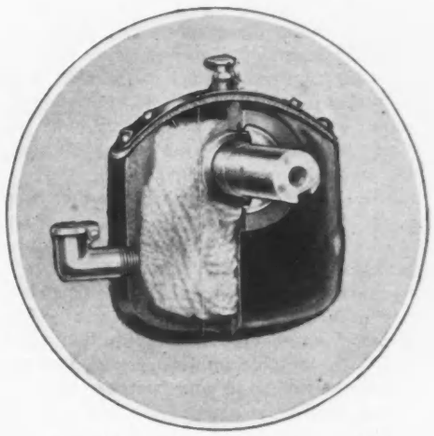
	RATE OF DUTY	
	Fordney-McCumber Tariff 1922	Hawley-Smoot Tariff 1930
Tungsten ore or concentrates (tungsten content) lb.	45¢	50¢
Tungsten metal, powder and carbide (tungsten content) lb.	60¢+25%	60¢+50%
Steel ingots, blooms, billets, etc., valued at not over 1¢ per lb. (lb.)	02¢	03¢
Steel bars, valued at not over 1¢ per lb. (lb.)	02¢	03¢

Raw Materials and Parts	RATE OF DUTY Fordney-McCumber Tariff 1922	Hawley-Smoot Tariff 1930
Aluminum, crude, scrap and alloys (lb.)	5¢	4¢
Aluminum, plates, sheets, bars, strips, rods, coils and blanks (lb.)	9¢	7¢
Aluminum, circles, discs, rectangles and squares (lb.)	9¢	7¢
Aluminum foil	35%	40%
Phosphor copper or phosphorus copper (lb.)	Free	3¢
Nickel oxide (lb.)	1¢	Free
Zinc ore, containing under 10% zinc (lb.)	Free	1½¢
Zinc ore, containing 10% and less than 20% zinc (lb.)	½¢	1½¢
Zinc ore, containing 20% and less than 25% zinc (lb.)	1¢	1½¢
Zinc ore, containing 25% or more zinc (lb.)	1½¢	1½¢
Manufactures of metal, not specially provided for, in chief value of, or plated with platinum or gold, or colored with gold lacquer	60%	65%
Manufactures of metal, not specially provided for, in chief value of base metal, not plated with platinum, gold or silver and not colored with gold lacquer	40%	45%
Granular or sponge iron (ton)	30%	$2.25
Hollow bars and hollow drill steel, valued over 4¢ a lb. (additional duty)	None	¾¢
Steel or iron containing chromium content in excess of 2/10% (cumulative duty), (lb.)	No provision	3¢
Pyrites, containing more than 3% zinc (lb.)	Free	1½¢
Cabinet wood in the log	10%	Free
Cabinet furniture of wood	33 1/3%	40%
Casein and casein mixtures, casein or lactarene (lb.)	2½¢	5½¢
Casein and casein mixtures of which casein or lactarene is the component material of chief value, not specially provided for	20%	5½¢
Compounds of casein, known as galalith or any other name, in finished or partly finished articles, not specially provided for (lb.)	40¢+25%	40¢+50%
Vulcanized fiber, made wholly or in chief value of cellulose	35%	30%
Sodium	Free*	25%
Lithium, beryllium, and caesium	Free*	25%
Linseed or flaxseed oil and combinations and mixtures (lb.)	3.3¢	4.5¢
Turpentine, gums and spirits of, and rosin	Free	5%
Cellulose acetate and compounds, combinations or mixtures containing cellulose acetate, in blocks, sheets, rods, tubes, etc.	40¢+10%	50¢
Cellulose acetate and compounds, in finished articles, not specially provided for	60%	80%
Cellulose compounds, including pyroxylin, transparent sheets more than 3/1000 and not more than 32/1000 in. in thickness (lb.)	40¢	45¢
Cellulose, transparent sheets, not exceeding 3/1000 in. in thickness (lb.)	25%	45%
Amber and amberoid, unmanufactured, not specially provided for (lb.)	$1.00	50¢
Mica, unmanufactured, valued above 15¢ per lb.	25%	4¢+25%
Mica, manufactured, cut, dimension sheets	30%	40%
Mica, splittings	30%	25¢+45%
Mica, phlogopite	10%	15%
Talc, steatite, soapstone, French chalk, and manufactures of, ground, washed, powdered, etc.	25%	35%
Graphite or plumbago, lump, chip or dust	20%	30%
Graphite, flake (lb.)	1½¢	1.65¢
Electric light carbons	45%	½ in. 60% other—45%
Laboratory glassware, lampblown, advolumetric ware	65%	85%
Laboratory glassware for experimental purposes, not specially provided for	65%	85%
Fused quartz ware	30%	50%
Fused quartz tubes or tubing	30%	40%
Illuminating glassware, chimneys	60%	55%
Illuminating glassware, globes, shades, etc.	60%	70%
Blown glassware, not specially provided for	55%	60%
Christmas tree ornaments	55%	60%
Optical glass for instruments	45%	50%
Electric lamps, incandescent, carbon filaments	20%	30%
Silk, woven fabrics, Jacquard figured	55%	65%
Rayon, woven, Jacquard figured	45¢+60%	45¢+70%
Tissue paper, condenser or similar (lb.)	6¢+15%	6¢+20%
Paper, manufactures of pulp, not specially provided for	25%	30%
Asbestos	30%	40%
Cork, discs, wafers and washers, 3/16 in. or less thick, made from natural cork (lb.)	20¢	25¢
Cork, discs, wafers or washers, made from artificial or composition cork (lb.)	10¢	12½¢
Cork, artificial, composition or compressed, in rough slabs, blanks or planks (lb.)	6¢	10¢
Granulated or ground cork (lb.)	25%	1 to 3¢

*25% to December 4, 1928; thereafter free by court decision.

(*Concluded on page 82*)

Plain Bearings *for* Electrical Machines—



CUT-away view of waste packed bearing for motors of 1 hp. and smaller. Packing is unbroken strands of wool yarn

Their Selection and Design

By G. A. UNGAR, M.E.
Consulting Engineer

PLAIN bearings are comprehensively discussed in this article, both from the standpoint of the designer and from that of engineers and purchasing agents who buy bearings ready made. An article by Mr. Ungar on the design and selection of ball and roller bearings appeared in the October, 1929 issue of *Electrical Manufacturing*. The author has been both Sales Engineer and Chief Engineer and Technical Director of one of our largest bearing manufacturers. For the past eleven years he has been a Consulting Engineer

TWO general types of plain bearings are at the disposal of the designer of electrical machinery.

A. Oilless bearings or initially lubricated bearings and
B. Lubricated bearings which are divided into
   a. Periodically lubricated bearings or bearings without lubricant chambers
   b. Continually lubricated bearings or bearings with lubricant chambers.

In theory oilless bearings are ideal. They are subject, however, to certain limitations regarding load and speed, but due to considerable improvements in their manufacturing methods and also due to experience gained in service in the past, they lend themselves readily to a number of applications in the electrical field. This is particularly the case with bearings which can receive little or no attention or where cleanliness or high temperatures would preclude the use of oil or grease.

Oilless bearings as a rule are not lubricated in service and therefore require the incorporation of a lubricant in liquid or solid form with the bearing material.

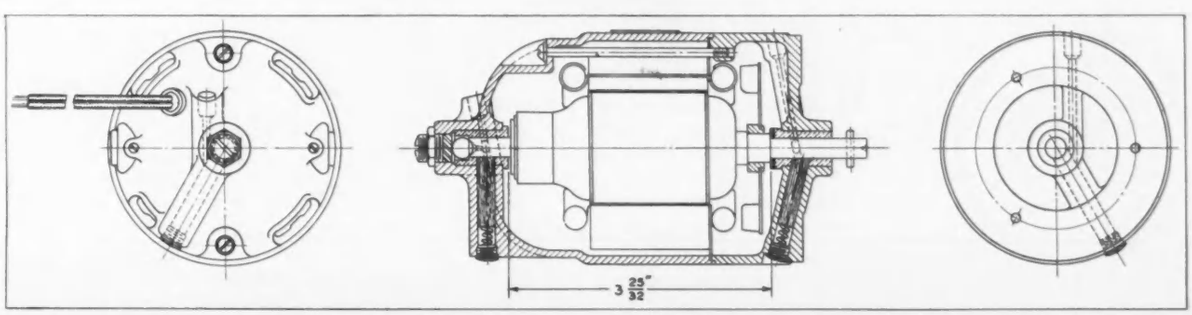
The bearings containing liquid lubricants are generally divided into two groups:

A. Hardwood or fiber bearings: Oil or tallow is used to thoroughly impregnate the pores. The method of impregnation varies with different manufacturers.
B. Metal bearings: A porous bearing bronze is employed to act as a sponge or reservoir for the lubricating oil. The porous structure is obtained by employing powdered metal. This metal is held together by a suitable binder and appropriate baking.

In another process the powdered bronze is die pressed and thereby partly fused, producing a porous structure.

Graphite is most generally employed as the solid lubricant in oilless bearings. It is used both as flake and amorphous graphite in conjunction with different types of binders. In general there are three principal methods of

SMALL universal motor with wick oiler. A single ball is used to take up the end thrust. The motor can be operated horizontally or vertically



applying the graphite to the bearing—

a. The graphite or a graphitic mixture is inserted into grooves or holes provided in a metallic bearing, which is usually bronze. The satisfactory performance of such bearings is a function of the qualities of the bearing metal and of the lubricating properties of the graphite employed.
b. Finely powdered metal (either bronze or babbitt) is mixed with graphite. This mixture is held together by a suitable binder, pressed into molds and baked or the graphite metal mixture is die-pressed under the application of heat, thereby producing partial fusing of the metal around the graphite.
c. Another type employs graphite only, held together by suitable binders. Such bearings are similar in their make-up and frictional characteristics to carbon brushes.

UNDER certain conditions (light loads) copper tin alloys with high percentages of lead will permit operation without lubrication. For electrical machinery, especially fractional horsepower motors subject to neglect on the part of the users, the employment of oilless bearings especially of the metal-oil impregnated type, if used in conjunction with some of the lubricating systems to be described later, will provide a very satisfactory insurance against burned out bearings and consequent damage to armatures and fields.

Due to their construction, oilless bearings should not be operated at heavy pressures or high rubbing speeds. The advice of the makers of oilless bearings regarding safe operating loads and speeds should always be obtained.

PERIODICALLY LUBRICATED BEARINGS do not have lubricant chambers or reservoirs, and a certain amount of lubricant, oil or grease is injected to the bearing surface through holes by means of oil or grease cups or pressure fittings.

While the majority of plain bearing applications in general practice belong to this group, bearings of this type have practically disappeared from modern electrical high speed machinery, especially for continuous service. Their principal advantage is mechanical simplicity and therefore low first cost. The development of pressure fittings, as well as the use of appropriate oilless bearing materials has eliminated some of their disadvantages.

An analysis of these bearings shows the following characteristics:

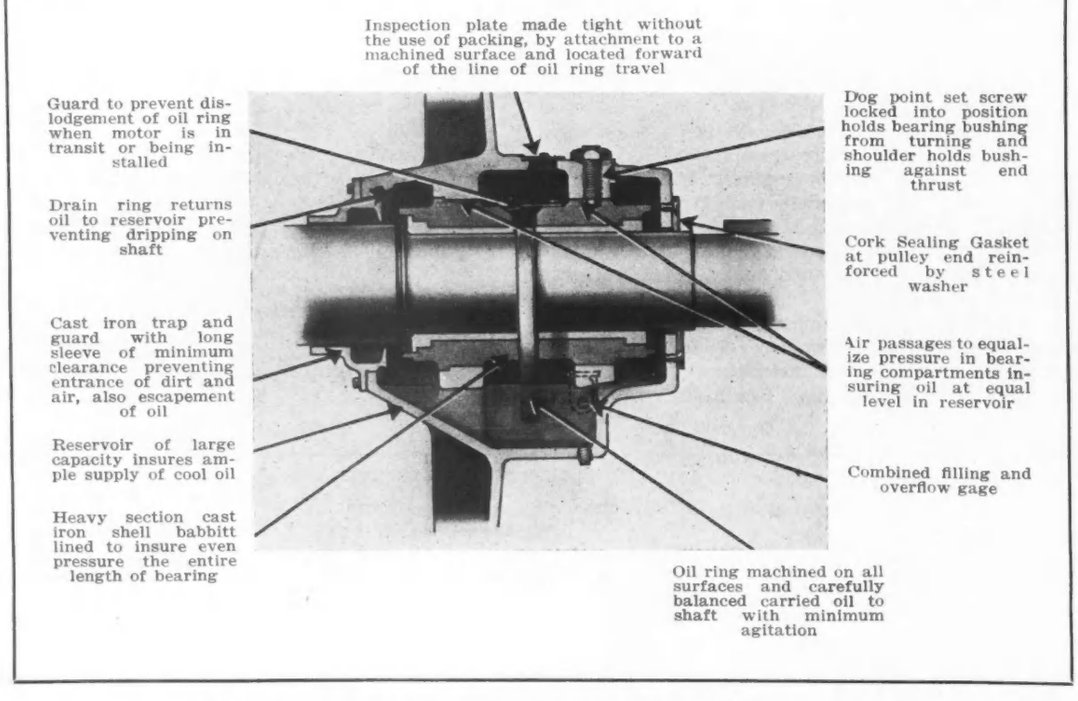
A. The load carrying capacity is medium.
B. They should be used only for moderate speeds.
C. Frictional losses are high when starting and medium to high when running, since the method of applying the lubricant does not always permit of forming a satisfactory lubricant film.
D. Temperature rise in operation is likely to be considerable between periods of lubrication unless appropriate oilless bearings are employed.
E. The amount of wear depends partly upon the materials employed and may be considerable unless lubricant is applied in regular and frequent intervals.

THE usual bearing metals for this class of bearings are babbitt (tin and lead base) bronze and cast iron.

CONTINUALLY LUBRICATED BEARINGS depend upon an uninterrupted supply of lubricant being available for the formation of the oil film when in operation and a number of constructions are successfully and extensively employed in modern electrical practice.

Satisfactory bearing performance is the result of proper coordination of the following factors:

I. Selection of bearing and shaft materials, and finish of surfaces.
II. Uniform load distribution and mechanical strength.


Inspection plate made tight without the use of packing, by attachment to a machined surface and located forward of the line of oil ring travel
Guard to prevent dislodgement of oil ring when motor is in transit or being installed
Drain ring returns oil to reservoir preventing dripping on shaft
Cast iron trap and guard with long sleeve of minimum clearance preventing entrance of dirt and air, also escapement of oil
Reservoir of large capacity insures ample supply of cool oil
Heavy section cast iron shell babbitt lined to insure even pressure the entire length of bearing
Dog point set screw locked into position holds bearing bushing from turning and shoulder holds bushing against end thrust
Cork Sealing Gasket at pulley end reinforced by steel washer
Air passages to equalize pressure in bearing compartments insuring oil at equal level in reservoir
Combined filling and overflow gage
Oil ring machined on all surfaces and carefully balanced carried oil to shaft with minimum agitation

RING oil bearing for large motors. Bearing shell is made of cast iron with babbitt lining. At the outer end a cork sealing gasket prevents oil leakage and entrance of dirt. A trap and guard prevent oil from getting to windings

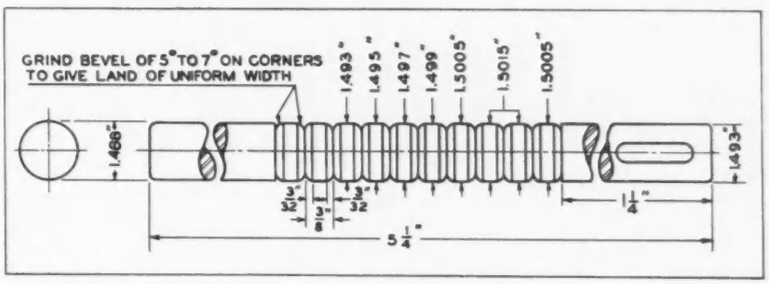
III. Lubrication and dissipation of frictional heat, clearances and oil grooves.
IV. Protection against foreign matter and leakage of lubricant.
V. Simplicity of design.
VI. Ease of mounting and dismounting.

BEARING AND SHAFT MATERIALS should be selected with due regard to service conditions (steady or intermittent), load (light or heavy, uniform or variable and shock), speed, required finish, effect of surrounding atmosphere or of liquids when operating submerged, influence of temperatures, result of lubricant failure and action of dirt and grit if it cannot be kept out of the bearing.

BEARING METALS should be selected for the following requirements:

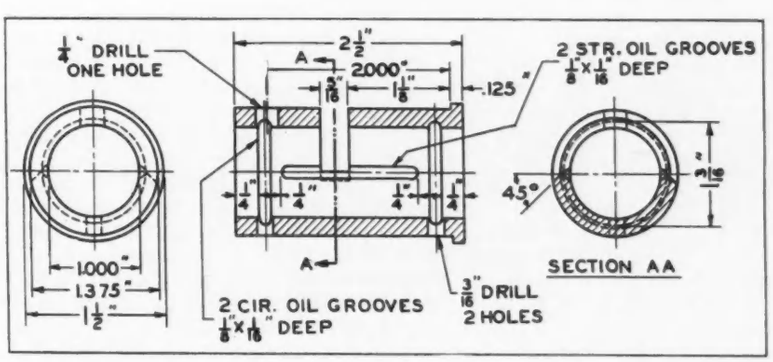
1. Sufficient strength to carry the load with an ample safety factor (measured in comparison with the permanent reduction of height of a test piece under compression stress).
2. Sufficient hardness to resist permanent distortion under maximum load (babbitt metals should not be so hard as to prevent ready conforming to the journal).
3. Ability to carry load at temperatures above normal.
4. Lowest possible coefficients of solid and boundary friction.
5. Ability to resist chemical action possible in service.
6. Uniformity of grain structure.
7. Good wearing properties.
8. Ready machineability to a smooth surface.

Bronze—A number of alloys, including so-called genuine bronze, lead and aluminum bronzes, etc., are available in various degrees of toughness, surface hardness and resistance to wear. Bronze bearings will be found advantageous for high pressures, shock load and generally medium surface speeds.



BURNISHING bar for rolled bronze bushings. The bore tolerance specified and maintained is 0.0005 *in.*

SECTIONAL views of a small ring-oiled armature bearing (below). Note the longitudinal grooves for oil distribution and the two circular grooves for the oil return



They are available as castings, as seamless tubes and made from flat sheets, rolled into tubular shape. Drawn or rolled bushings provide bearings with greater surface hardness than cast bronze.

Steel—As a bearing material, steel is employed only for precision bearings or very heavy shock loads and then almost always with hardened bearing surfaces.

Babbitt (Anti-friction Metal)—These bearings are employed in the form of linings attached to an outer shell, usually of cast iron or bronze.

In addition to providing a material having a low coefficient of solid and boundary friction and which does not seize on the shaft with failure of the lubricant supply, the babbitt should also supply a comparatively elastic cushion between the outer shell and the shaft. This cushioning is required in case of uneven load distribution due to shaft deflection or misalignment. With hot bearings babbitt is less likely to damage the shaft surface than ordinary bronze, steel or cast iron bearings.

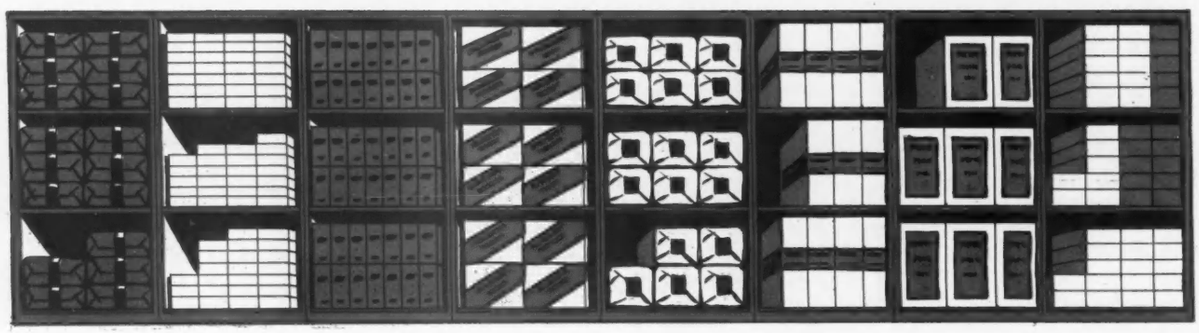
Babbitt linings are generally in thickness of 1/8 in. and over, and must be provided with sufficient anchorage in the supporting shell. These anchors take the form of dovetailed grooves or holes drilled in the shell and counterbored from the outside. Improved conditions are obtained by sweating or binding the babbitt to the shell by trimming the latter and using potassium chloride as flux. Tin base babbitts sweated to a bronze shell are sometimes used in thicknesses of 1/32 in. and even less.

Both tin base and lead base babbitts are employed. Babbitt lined bearings are used extensively for low to medium pressures, for low, medium and high speeds. From the standpoint of first cost and replacement, babbitt bearings represent the most economical type of bearings.

Cast Iron—With properly finished and lubricated surfaces, close-grained cast iron provides an excellent bearing material of a smooth and hard surface. With properly run-in surfaces, it is entirely suitable for heavy loads and high speed operation.

FINISH OF BEARING SURFACES—Bearing surfaces of bronze, cast iron and steel should be bored with the bushings in place and alignment assured, unless provisions are made to support the bushings in self-aligning seats. Instead of reaming, broaching can be employed. In order to reduce the running-in period, the surfaces are scraped or burnished. This burnishing is done by means of a bar, illustrated in the middle of this page having ridges with gradually increasing diameters. The graduation of the diameters depends upon the material of the bushing, the amount of material to be flattened out and the resilience of the material supporting the bushing. The largest diameter should be from 0.0005 to 0.001 in. larger than the finished hole size to allow for the elastic contraction of the bushing. One end is inserted into the hole of the bushing which is finished to within 0.001 to 0.002 in of the finished bearing size. The burnishing bar is pressed through the hole, accurately guided to insure a straight hole. The surface produced in this manner is perfectly smooth and uniform and at the same time harder than before burnishing.

(To be concluded in an early issue)



"We Expect to be Jobber

By A. A. SCHUELER

General Sales Manager, Square D Company

ABOUT twenty years ago, a Detroit manufacturer of non-renewable fuses made a little business trip across the river into Canada. In one of the plants that he visited, he happened to notice a cast-iron closed switch.

At this time, as everybody in the electrical business will remember, it was almost universal practice, in industrial plants and in homes, to have a simple open jackknife switch. The open switch was dangerous, everybody knew. But no one, apparently, had considered doing anything about it.

The safety feature of the cast-iron switch appealed to this manufacturer's imagination. He learned that the switch was made in England, and upon his return to Detroit wrote to the English manufacturer and obtained from him his American and Canadian rights.

So far so good. But when we undertook to sell our fascinating new cast-iron switches, it was a different story. A jackknife switch did not cost very much. And when we came to him with our big and heavy cast-iron switch at about four or five times the cost of the knife switch, it was not a simple matter to get him to appreciate its merits.

We sold some cast-iron switches, it is true. We still sell some, for special uses such as for outdoor protection in connection with floodlighting of industrial yards. But on the whole we were not getting anywhere with our new switch.

We put the matter right up to some of the men on whom we were calling. "Now just what would you advise us to do?" we asked. "You see as readily as we do the advantages of this new switch, yet you do not want it."

"Why not just take a simple jackknife switch, put a steel box around it, and have an outside control?" said several.

And we did.

THIS was the beginning of the safety switch business. I have told this story not merely because in itself it may be interesting to other manufacturers, but also because it illustrates an important point in the sales policies upon which the present Square D Company has been built.

On more than one occasion, direct and frequent contact with users of our products has led us into important forward steps in our progress. For instance besides safety switches, it has been responsible for at least two of the lines which we now profitably manufacture.

But if this direct contact with users is so important, why are we perhaps the most persistent supporter of the electrical jobbers among the companies in our particular field of electrical manufacturing? Why are we jobber fans?

The answer is because we find just as much benefit in using the jobber for an outlet as we do in maintaining constant direct contact, and are able to profit by both.

In first putting safety switches on the market, it was logical for us to seek out the jobber. In no other way could we have obtained wide distribution of this particular item. Today, not only ourselves but the five leading makers of safety switches have practically 100 per cent jobber outlet.

But it was when we began to extend our manufacture into other lines that the real test of our loyalty to the jobber came.

When, for instance, we considered production of lighting panels, other manufacturers told us to stay away from the jobber.

"You are crazy if you try to sell lighting panels through the jobber," some very good friends told us. "You are taking a big risk on every panel you put in a jobber's stock. We have tried it, and we know. The jobber will not be able to sell your stuff, and after a while it will come back to you and you will have to go about building up your business some other way."

BUT we went right ahead with our jobber distribution plans, and at the end of a year of trial we found that stock in jobbers hands was turning over, and that we had not been taking back stock.

Several of our jobbers are now stocking complete panels, although at first they carried only boxes. When a large office building is being constructed, the contractors usually want the boxes six or nine months ahead of their electrical contents. In any case, such a building requires more panel boxes than a jobber should keep in stock, and the order has to be shipped directly from the factory. But the contractor on the smaller job, the man who wants from three to six panels, usually wants them complete at the time of purchase. And it is our theory that this is the trade the jobber can serve to the best advantage and for which he should carry stock, therefore, not of boxes alone but of complete panels. In every case where we have tried out this theory, the jobber's stock of complete panels has turned over very nicely.

Again, when the Industrial-Controller Company of Milwaukee was merged with Square D, the question came up, "Shall we use the jobber on this line, or shall we not?"

There were a number of reasons for not doing so.

One reason was that Industrial-Controller Company already had a well-developed market in which the jobber did not figure.

More serious was the fact that in the marketing of motor

control it is customary with all manufacturers to give to the motor manufacturer and the machine manufacturer the same price that is made to a jobber.

In spite of these points, we have broadened the market for Industrial-Controller products through jobber connections.

In the first place we found that the Industrial-Controller Company, through its direct selling had made itself particularly strong in certain districts. But some important districts it had not even attempted to cover. How much of the change was due to the new jobber outlets we were able to bring into the situation, how much was due to the unusually good business conditions prevailing at the end of 1928 and beginning of 1929, it is impossible to say, but at any rate during the first six months under jobber distribution Industrial-Controller sales showed a substantial increase.

While adhering to the prevailing discounts for motor control, we have shown jobbers how they can get control business which we otherwise would lose. Every little contractor in the country, for instance, at some time needs control equipment, and usually the jobber is the one who is most apt to know of his need and who is the best equipped to serve him.

Square D products now comprise switches, motor control, panel boards, wire duct, and electrical porcelain. In only the last named is there no jobber outlet at all. Porcelain is the product of our Specialties Department, and has an entirely separate marketing force, selling largely to users of electrical porcelain who do not have their own porcelain plants.

Of course success in marketing through jobbers is not automatic. And here is where the continuance of our custom of keeping in close contact with users comes in. We have never sat back in our chairs and expected the jobber to move our merchandise simply because we have made it the best we know how, advertised it, and placed it in his hands. Instead, we are constantly increasing our sales force, and this means our force of missionaries. A few years ago we had twenty salesmen; now the number is over seventy. It was forty-two before our consolidation with Industrial-Controller Company, sixty afterward. Since Diamond Electrical Manufacturing Company, of California, has consolidated with us, the number is seventy-one. And we have authorized the addition of two more salesmen.

SOME electrical manufacturers we know hold that the electrical jobber is unintelligent. We hold that if you will do intelligent things for him, he will do intelligent things for you.

Manufacturers still tell us that the jobber cannot handle a line as complicated as panel boards. Of some jobbers this is true. But others are just as intelligent, electrically and in merchandising, as are the manufacturers. A lot of the men working for jobbers have at one time or another been electrical contractors or engineers in industrial plants.

Some manufacturers believe in what is really going into competition with their jobbers after they have stocked them up. The manufacturers' salesmen call on all important leads, and when they secure an order they do not feel that the jobber is entitled to any share in it.

Our theory is the opposite. We consider the jobbers a part of our own organization, and treat them as such. We think of them not only as our representatives, but as our warehouses. We help them to market the stock we sell them, and if for any reason it will not sell we take care of them. But most important of all, except in the case of control apparatus, in which as I have mentioned we find it best to conform to the usual practice of the industry, a big majority of the orders that come to us come through jobbers.

What this means is that when one of our seventy odd sales representatives has the opportunity actually to book an order for switches or panels or ducts, he asks the customer to make the order out in the name of his regular jobber. We then take the order to the jobber ourselves. This method not only gives the jobber the benefit of a profitable share in the order but also reminds him that we are working in his behalf instead of competing with him.

SOMETIMES a jobber or a jobber's man will call one of our district managers up, and ask to have a salesman go out with him to help land a particular order. We always fall in with such requests, unless some other jobber has previously asked assistance on the same order.

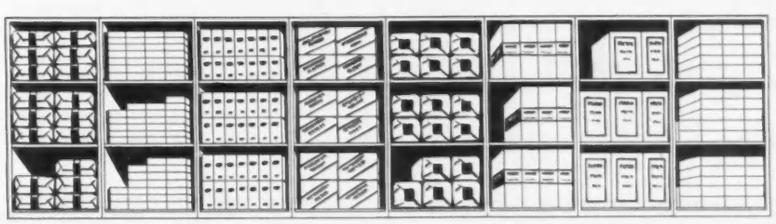
So closely do jobbers work with us, so well-established is the feeling that they are really a part of our organization, that on some occasions jobbers bring special problems to us, and we meet these special problems on their behalf, with a special design. A case in point is that of an electrical stove which has recently been brought out by a Detroit manufacturer. Our share in this business came to us through a jobber, who learned of the impending business before we did, and asked us if we could make a specially designed 60-ampere entrance switch, because of the additional amperage called for when one of these stoves is installed.

This is in fact a very good example of the service which an alert jobber gives to us—the service which keeps us "sold" on using jobbers for as many of our products as possible.

Our own men are constantly calling on users of electrical equipment. Each man has his territory, and gets around it

(*Continued on page 82*)

"Fans for a Good Long Time"



How Much Material

Tables compiled and used by

J. K. OLSEN
Stewart-Warner Corp.

Extra copies are available. Write the Editor.

IT might be any part of any machine, but in this case the part in question is part of an annunciator assembly. It has been designed to be stamped from strip steel, and the problem is to estimate how many pounds of raw material will be required for each thousand stampings.

To calculate this, it is necessary to know the weight of some unit volume of the material. The unit usually used is the weight per cubic inch. Having this figure, the weight per stamping is the volume in cubic inches multiplied by the weight per cubic inch. In estimating the amount of material required per thousand stampings, an allowance of 5 per cent is usually made for wastage.

In the accompanying table (half of which was published last month), are given the weight per cubic inch of the common materials used in electrical products, and a weight constant for figuring the weight per thousand pieces, allowing 5 per cent for wastage.

To illustrate the use of the table, let us estimate the weight per thousand pieces of the stamping sketched on this page.

Volume in cubic inches—

$$1.7 \times 0.5 \times 0.08 = .068 \text{ cu. in.}$$

Weight per thousand pieces—

$$.068 \times 297.5 = 20.23 \text{ lb.}$$

*See table under heading STEEL, Strip Cold Rolled.

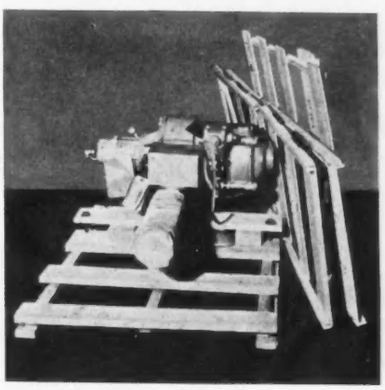
Column 1	Column 2	Column 3	Column 4
MATERIAL	Commercial and Preferred Gage or Size	Exact Weight in Lbs. Per Cubic Inch	Constant for Weight in Lbs. Per 1000 Pieces Plus 5% Ccrap
LEAD			
Pipe Drawn to Weight	Inside diam. in fractions of an inch		
Sheet Rolled to Weight	Thickness in pounds or ounces per square foot		
Tubing	Inside diam. in fractions of an inch. Wall thickness in fractions of an inch		
Wire	Diam. in Birmingham or Stubs wire gage or American (B. & S.) wire gage	.4106	431.1
MANGANIN			
Wire	Diameter in American (B. & S.) wire gage	.3067	322.0

for ?,000 of These?

Column 1	Column 2	Column 3	Column 4
MATERIAL	Commercial and Preferred Gage or Size	Exact Weight in Lbs. Per Cubic Inch	Constant for Weight in Lbs. Per 1000 Pieces Plus 5% Scrap
MICA			
"A"	Thickness in decimals or fractions of an inch	.0800	84.0
"B"		.0875	91.9
Flexible		.0700	73.5
MONEL			
Angles	Standard		
Rod	Diameter in fractions of an inch		
Sheet	Thickness in U. S. Standard plate gage or in fractions of an inch		
Wire	Diam. in American (B. & S.) wire gage	.3230	339.2
Tubing Welded	Outside diam. in fractions of an inch. Wall thickness in Birmingham or Stubs wire gage	.3209	336.9
NICKEL			
Pipe	Standard wrought iron pipe sizes		
Seamless Tubing	Outside diam. in fractions of an inch. Wall thickness in Birmingham or Stubs wire gage	.3190	335.0
Rod	Diam. in fractions of an inch	.3230	339.2
Sheet	Thickness in U. S. Standard plate gage or in fractions of an inch	.3195	335.5
Wire	Diam. in American (B. & S.) wire gage	.3178	333.7
NICKEL CHROMIUM			
Nichrome Rod	Diam. in fractions of an inch		
Nichrome Flats	Thickness in fractions of an inch	.3060	321.3
NICKEL SILVER			
Leaded Rod	Diam. in fractions of an inch	.3996	419.6
18% Sheet	Thickness in American (B. & S.) wire gage		
18% Tubing Brazed	Outside diam. in fractions of an inch. Wall thickness in American (B. & S.) wire gage		
18% Wire	Diam. in American (B. & S.) wire gage	.3180	333.9
PAPER			
Blotting Paper	Thickness in fractions or decimals of an inch	.019	20
White		.021	22
Black			
Fish Paper (Gray)	Thickness in decimals of an inch	.045	47
Red Rope Paper	Thickness in fractions or decimals of an inch	.045	47
PLATINUM			
Sheet	Thickness in decimals of an inch	(11.2945) (Troy Ozs.)	(11,859.2)
Wire	Diam. in decimals of an inch or American (B. & S.) wire gage	.77448	813.20
RUBBER HARD Ebonite			
Rod	Diam. in fractions of an inch		
Black		.0426	44.7
Red		.0972	102.1
Brown		.0628	65.9
Sheet	Thickness in fractions of an inch or in American (B. & S.) wire gage		44.7
Tubing	Outside and inside diam. in fractions of an inch	.0426	44.7
RUBBER Soft			
Medium	Thickness in fractions of an inch	.050	53
Sponge		.020	21

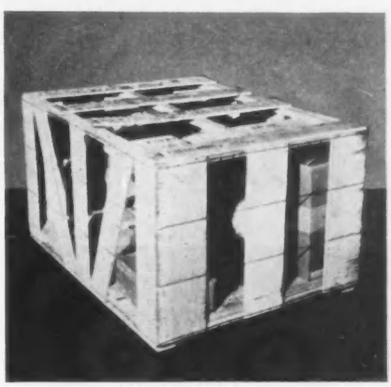
Column 1	Column 2	Column 3	Column 4
MATERIAL	Commercial and Preferred Gage or Size	Exact Weight in Lbs. Per Cubic Inch	Constant for Weight in Lbs. Per 1000 Pieces Plus 5% Scrap
SOLDER			
Wire—(50% Lead) (50% Tin)	Diam. in American (B. & S.) wire gage or in English Standard gage	.3380	354.9
STEEL Carbon			
Angle	Standard		
Beams	Standard		
Bar	Thickness in fractions of an inch or U. S. Standard Plate Gage. Width in fractions of an inch		
Rod, Screw Mach. Stock	Diam. in fractions of an inch		
Sewer Rod	Thickness in Birmingham or Stubs wire gage or in fractions of an inch. Width in fractions of an inch		
Pipe	Standard wrought iron pipe sizes		
Seamless Tubing	Outside diam. in fractions of an inch. Wall thickness in Birmingham or Stubs wire gage		
Plate and Sheet Cold Rolled	Thickness in fractions of an inch		
Automobile	Cr in U. S. Standard plate gage		
Strip Cold Rolled	Thickness in Birmingham or Stubs wire gage	.2833	297.5
Shim	Thickness in Birmingham or Stubs wire gage. Width in inches	.2833	
Spring Black Oil Tempered	Thickness in fractions of an inch or in Birmingham or Stubs wire gage		
Spring, Bar or Strip	Thickness and width in fractions of an inch		
Wire, Cold Drawn	Diam. in Washburn & Moen wire gage		
Wire, Ribbon	Thickness in Birmingham or Stubs wire gage. Width in fractions of an inch		
Wire, Music	Diam. in U. S. Standard Music wire gage		
Wire Cloth Screen	Wire in Washburn & Moen wire gage		
Band and Hoops	Thickness in Birmingham or Stubs wire gage. Width in fractions of an inch	.2833	297.5
Drill Rod	Diam. in Birmingham or Stubs wire gage or in fractions of an inch	.2850	299.3
Strip, Hot Rolled	Thickness in Birmingham or Stubs wire gage	.2820	296.1
Clock Springs	Thickness in decimals and fractions of an inch	.2800	294.0
STEEL, TOOL STEEL HIGH SPEED			
Rod	Diam. in fractions of an inch	.3183	334.2
STEEL, NICKEL			
Rod	Diam. in fractions of an inch	.2833	297.5
STEEL, STAINLESS			
12–14% Cr. Rod Sheet	Diam. in fractions of an inch thickness in U. S. Standard plate gage or in fractions of an inch	.2810	295.1
20% Cr. Rod	Diam. in fractions of an inch		
1% Cu Sheet	Thickness in U. S. Standard plate gage or in fractions of an inch	.2777	291.6
STEEL, COATED			
Terne Plate 8— Coat	Thickness in U. S. Standard plate gage	.2836	297.8
Tin Plate	Thickness in U. S. Standard plate gage	.2778	291.7
Galvanized Sheet	Thickness of base in U. S. Standard plate gage	.2778 Plus 2.5 ozs. per sq. ft.	291.7
THERMOSTATIC METAL (Brass and Invar. Steel)	Thickness in decimals of an inch	.3009	315.9
TIN			
Pipe	Inside and outside diam. in fractions of an inch		
Sheet	Thickness in American (B. & S.) wire gage	.2650	278.3
VELLUMOID			
Sheet	Thickness in decimals and fractions of an inch	.037	39
ZINC			
Rod	Diameter in fractions of an inch		
Sheet	Thickness in zinc gage		
Tubing	Outside diameter in inches. Wall thickness "American (B. & S.) wire gage"	.2604	273.4

More Wire and Less Wood Saves Time and Freight



BY using wire bound crates instead of all-wood crates, the Williams Oil-o-Matic Heating Corp. saves its dealers $40,000 yearly in reduced transportation, and saves itself one dollar on every crate. The wire bound crate is uniform, light and durable

WIRE bound crates cut packing time more than half at the Williams plant. Packers begin with the crate 80 per cent assembled (left), and in ten minutes the product is ready for domestic or foreign shipment (right)

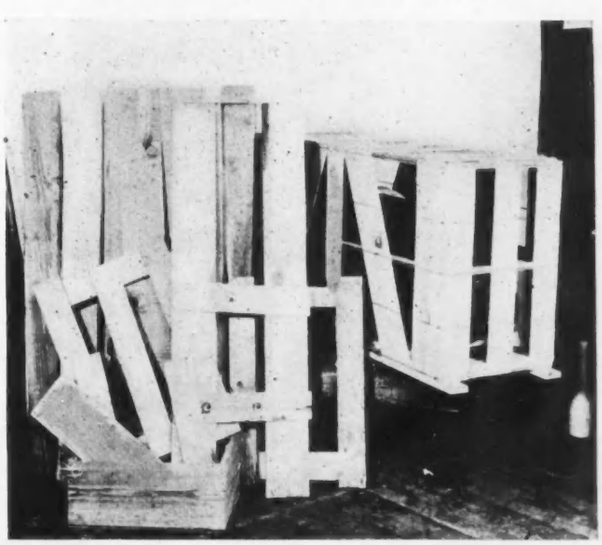


SAFETY in transit is the first essential in packing finely finished electrical merchandise. The weight of evaporators and compressors packed with electric controls ranges from 200 to 600 pounds. In attempting to safeguard their goods, the Williams Oil-o-Matic Heating Corporation of Bloomington, Ill., formerly built shipping crates and boxes from lumber, using plenty of material braced and nailed with the utmost care.

Despite the use of this type of crate, damaged shipments continued, leading the traffic manager to adopt a new type of crate. This new crate was arrived at by making up experimental crates, packing them with merchandising units and putting them through a series of artificially created shipping hazards. The final design resulted in a standard type having a fairly uniform standard of strength. The strength is determinable and can be established at any point set by the needs of the article to be packed. The old crates, however, varied widely and because of this fact had to be made with a wide factor of safety. This new crate involves the use of much lighter materials, especially in the sides and ends, the real strength of the containers being furnished by wire strapping. It was found that the heavy material formerly used contributed nothing to box strength that was not more than compensated for by the binding wires in the new type of container used by this company.

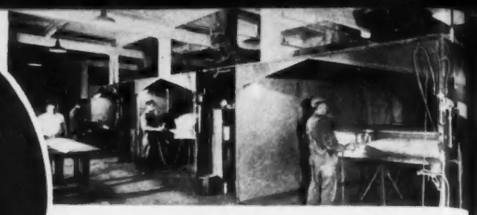
The consequent reductions in shipping weight of containers alone saves $40,000 yearly to the firm's dealers in reduced transportation charges. The compressor unit of the commercial refrigerating outfit which weighed 550 lb., packed by the old method, weighs 485 lb. in the new container, a reduction of 65 lb. An oil burner model formerly shipped at 250 lb., weighs 210 lb. in the new box, the 40-lb. saving meaning a freight saving of $2.10 to Pacific Coast dealers. A Dist-o-Stove model was reduced from 204 to 154 lb.

THIS shows how Williams reduced the shipping weight of each merchandising item 40 to 60 pounds. At the left is the lumber of the old crate, and at the right the lighter and more efficient crate a dollar apiece cheaper



Dealers find an additional saving in the used container when outfits must be returned to the factory for service, 90 per cent of the crates being serviceable for re-use. Employment of the new crate has also reduced the number of operations in assembling and packing oil burners. That this is a considerable factor is evident when it is appreciated that this new method has increased the packing rate per man from 2½ to 6 burners per hour.

Also because of crating with less bulky materials a freight car will hold more goods under the newer method. There is a gain of $4,500 to $6,000 in the merchandise value of a 36-ft. car of oil burners.

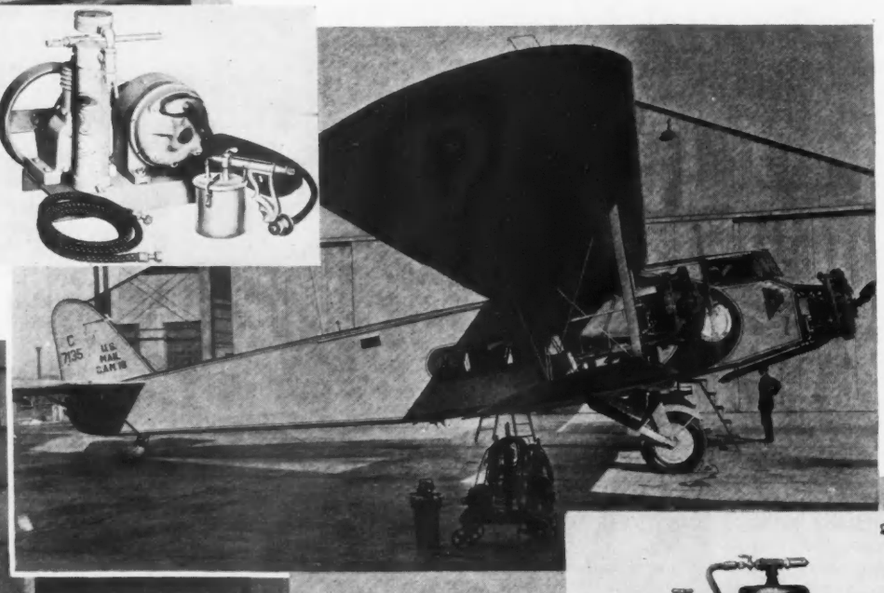


CONSTRUCTION equipment (left), railway cars (circle), and coffins (above) are three widely differing products that are most economically painted with air brushes

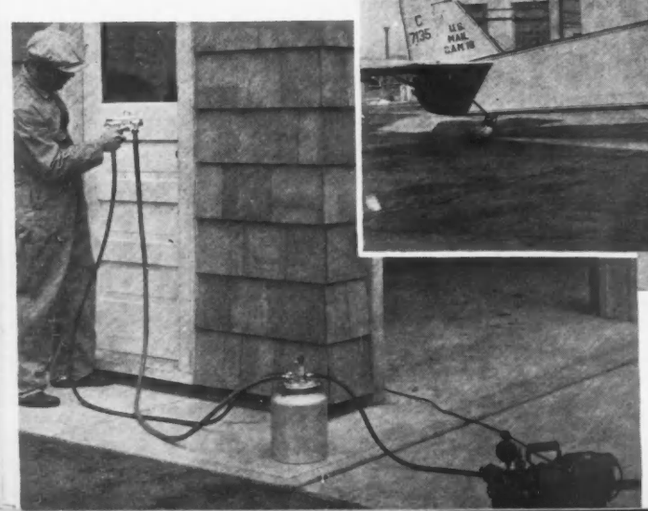
Here Is a Market for E

Air Brushes

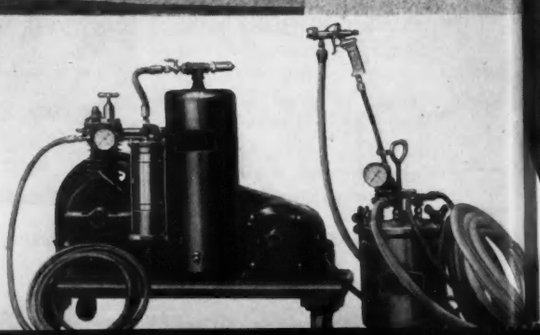
FEW products have a wider potential market than motor driven air brushes. Illustrations on this and the opposite page suggest the wide variety of applications of this product and its vast marketing possibilities. This is a fruitful small motor market

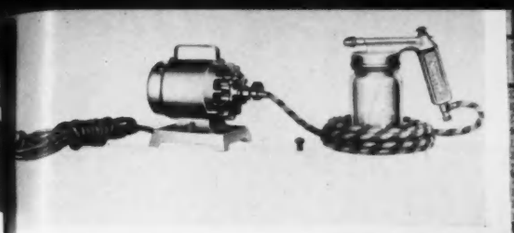


LARGE air brushes for storage tanks (above), and small ones for the home (below), suggest the variety of this market



AVIATION, the great new market for motor driven air brushes. Equipment must be provided for painting both planes and buildings





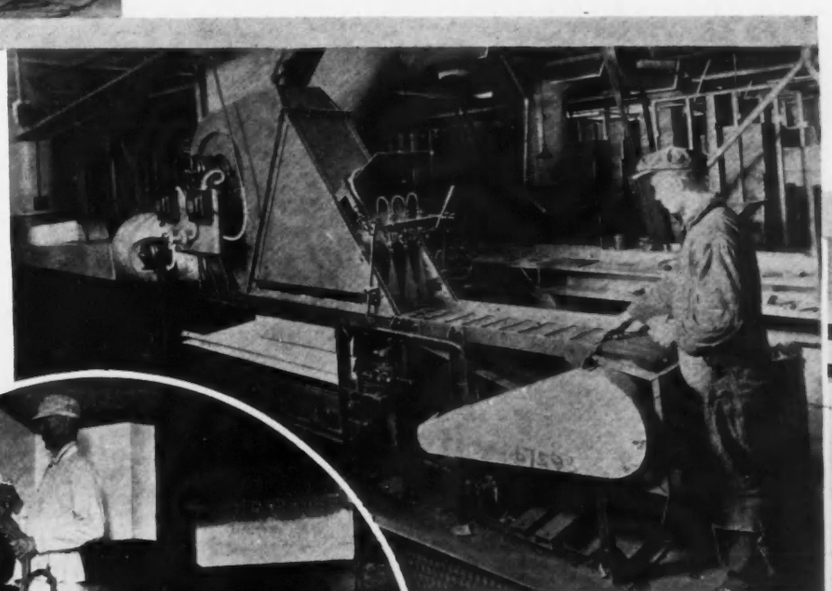
Electrical Equipment

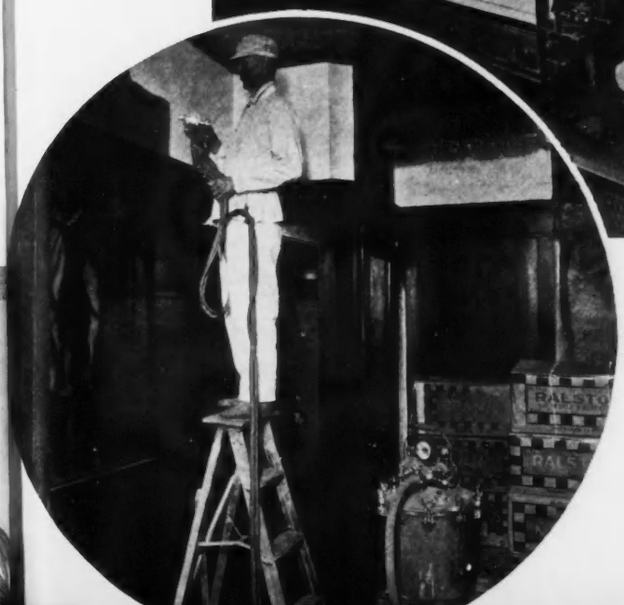
IN new building construction (above) motor driven air brushes are great money and time savers. Building contractors are quite generally buying this type of equipment

Steel work (left) can be painted by air brush in a fraction of the time it takes by any other method of painting. When a contractor buys an air brush, he buys motor and control equipment

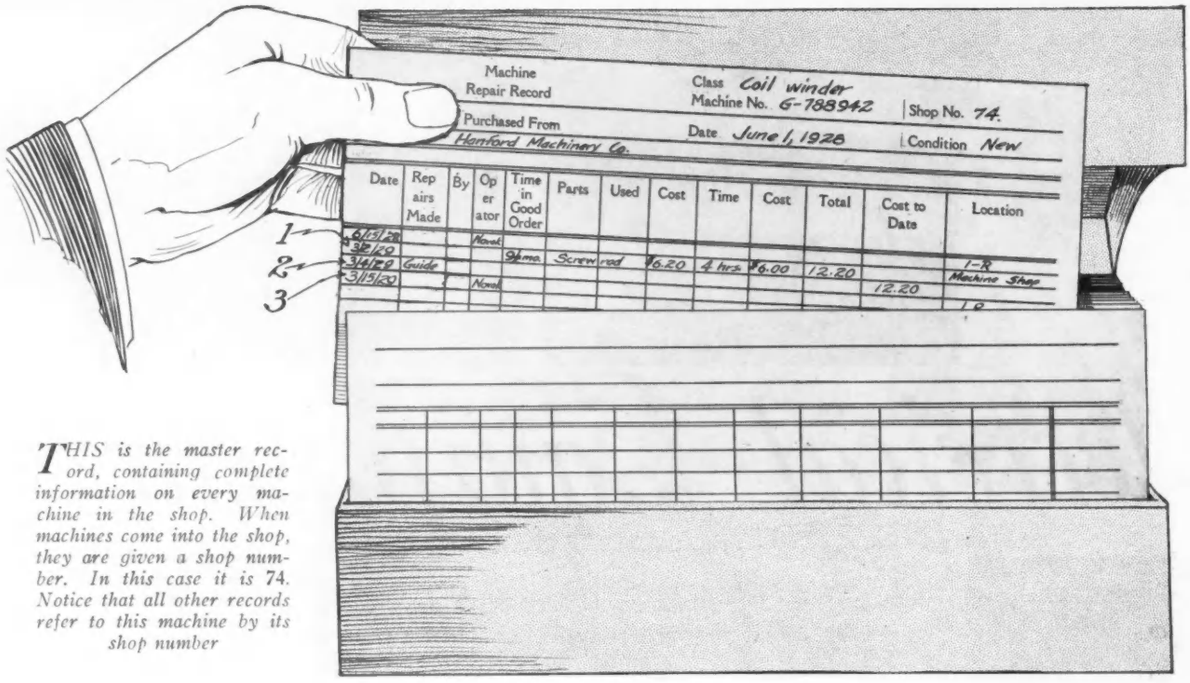
SPRAY has almost entirely supplanted brush in the painting of automobiles (above) and to some extent the exterior of buildings (right). Notice the motor and control equipment required for the production spraying machine below

There is a great home market for air brush equipment, for the painting of interiors, pictures frames, furniture, and garden woodwork





TYPICAL motor driven air brushes make use of motors of about ¼ hp. Most of these motors are universal and operate on 110 volts. Larger air painting outfits use 1/3, ¾, 1½, and 2 hp. motors, and there are many calls for brushes operating on 220 volts. Many of these large size brushes use induction motors



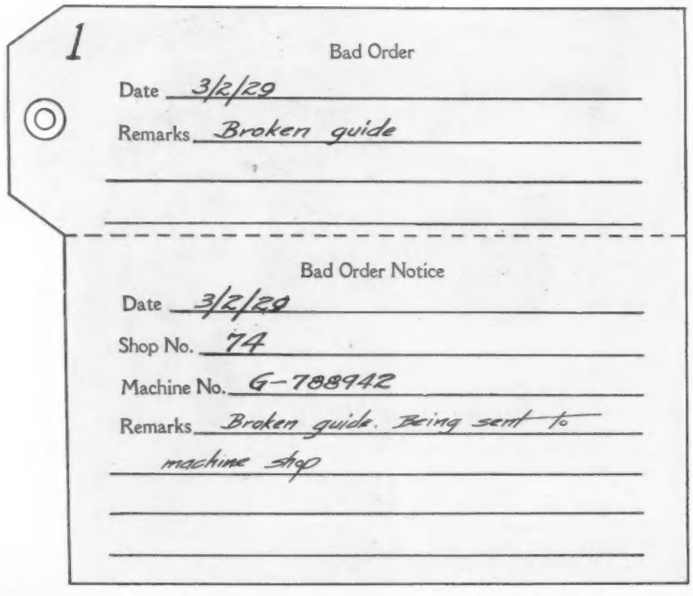
THIS is the master record, containing complete information on every machine in the shop. When machines come into the shop, they are given a shop number. In this case it is 74. Notice that all other records refer to this machine by its shop number

What About Machine

MACHINE repairs are looked upon by many factory managers as a necessary evil, to be endured rather than profited by. Where no system of repair records is maintained, this is actually the case. To those who have given no thought to such records it will be surprising to find that much valuable data can be secured if they are kept in a comprehensive manner.

Where a large number of machines are operated by many employees, it is important to know not only which machines are giving the best service, but also which operators are securing the best service from the machines in use. Where this information is secured in such accurate form that results can be posted from time to time, a friendly rivalry is aroused among the employees. Such a rivalry must work to the advantage of the employer. A machine repair record not only furnishes an accurate record of maintenance costs, but also gives it in such form that relative efficiency of operators and adjusters as well as the efficiency of the various machines is obtained. In a manufacturing business where very many small machines are used, a sound basis of comparison becomes especially valuable.

In the operation of this system an account is opened for each separate machine on the machine repair record. In the heading for each account is shown the class of equipment, machine number, shop number, from whom purchased, date of purchase, cost, and



WHEN a machine is taken out of service for any reason, this report is made out for a record. The Bad Order tag stays with the machine, and the Bad Order Notice is sent to the office

As the Bad Order Notices come into the office, the information is taken from them and entered on the master record above. Line (1) in the master record corresponds to the Bad Order Notice

Number 74?

1. When bought and from whom?
2. When was it put in service?
3. When and why shut down?
4. What repairs were made?
5. When returned to service?

All of these questions can be answered immediately by consulting the master record shown at the top of the opposite page. Information for this master record is reported on the others shown

By J. J. BERLINER

condition when purchased. The shop number is assigned to each machine or piece of equipment at the time of purchase, for convenience, and in all foremen's and employees' reports it is referred to by this shop number only.

As an example of the method followed in this system, a typical case has been taken. Machine No. G-788942 was purchased June 1, 1928, and entered on the machine repair record. At the time of purchase it was placed in stock, where it remained until June 15. It was then set up in space 1-R and assigned to operator Novak. On March 2, 1929, this machine required certain repairs and adjustments, and a bad order card and notice (illustration), were filled out. Bad order cards are printed on red tags with the bad order notice attached. The tag is to be fastened to the machine and the notice detached and sent to the office.

As soon as the bad order notice is received at the office, it is entered on the machine repair record and given to the machinist or adjuster, who makes the necessary repairs, replaces the bad order tag with a green good order tag, fills out the machinist report, and returns it to the office. Should the repaired machine be placed in stock, this fact is noted and the data from the machinist report is also entered in the machine repair record.

IF the machine that has broken down is sent to the machine shop, an examination of the machine is made and a report made out describing the nature and cost of repairs that will be necessary

Information from this record is entered on the master record as shown at (2) (see opposite page)

2

Machinist Report

Date 3/4/29 Shop No. 74
Class Winding machine Machine No. G788942

Nature of Repairs
Broken winding guide

	Parts Used	Cost	Total
	Screw rod	6.20	6.20
	Total Parts		
	Time 4 hrs. Hrs., at	1.50	6.00
	Total Cost		$12.20
	Form M-5C		

The green good order tag remains on the machine until it is again taken from stock and put in service, when it is removed by the operator to whom the machine is assigned. The operator, after testing the machine and satisfying himself that it is in perfect condition, signs the good order card and returns it to the office, where the final entry is made.

The record is continued in this way throughout the life of the machine, one complete cycle in the record being from the commencement of service after repairs, again in good order. The total time in good order, total time in stock, cost of repair parts and labor, and the time in use by various operators are clearly shown. The present location of any machine can be obtained from this record at a glance.

Personal data relating to employees may be compiled in various forms so that it is possible to compare the efficiency of the different operators either by a study of the time required for repairs to their machines or by the actual cost of such repairs. While this is but one factor governing their earning efficiency, it is found in many cases to be an important one, and one very often entirely disregarded.

Such a record as the one described is applicable to practically all businesses where machinery, tools, and equipment are used, and may be modified or enlarged to suit the particular case as the circumstances require.

In the small electrical manufacturing plant this machine accounting record can include more information about operation.

WHEN repair of the machine has been completed, this Good Order record is made out and sent to the office for entering on the master record as shown at (3) in the illustration at the top of the opposite page. This record tells what repairs were made and where the machine was sent

3

Good Order

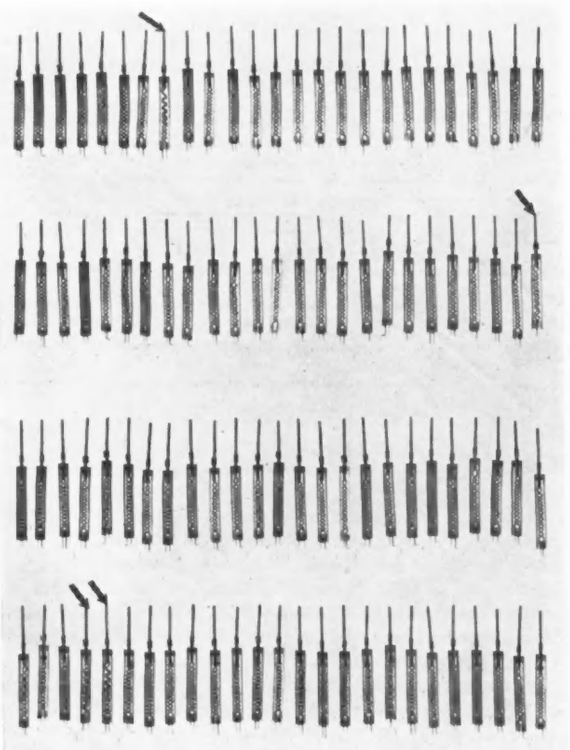
Date Repaired 3/15/29
Repairs Made Made new screw rod for winding guide. Sent back to 1-R

Shop No. 74
Class Coil winding machine
Machine No. G-788942

Signed J. K. Allison
Adjuster

X-Ray—An Inspection Tool

A PROMINENT radio tube manufacturer makes successful use of the X-ray in searching out hidden weaknesses not revealed by any other standard test. A suggestion for raising standards of other products



A PRINT from one of the inspection films. In this lot of 100 *cathodes there were four defective heaters, indicated by arrows. It is significant that these four cathodes would all work with apparent satisfaction on the final inspection and aging tests, for none of them is completely short-circuited, but when placed in a user's set they would soon go dead*

THE use of the X-ray in testing radio tubes for defects is the latest step the Eveready Raytheon tube factory at Newton, Mass., has taken to insure uniform quality and to eliminate from shipment those tubes which pass ordinary tests but which nevertheless have defects undetectable by any other method. This new method of testing should suggest an answer to many difficult inspection problems pertaining to all types of electrical equipment.

The delicate cathode is the part of the tube wherein defects which cannot be detected by any other known test frequently occur. It requires extremely nimble fingers to assemble the tiny cathode parts and any rough handling during assembly may seriously damage the heater coil. In putting the parts together, the last operation is to stretch the coil tight by pulling on the top supporting rod until the coil stretches slightly, and then welding the collar on the rod to prevent slipping back through the hole in the bushing. If too much tension is applied to the coil it will be stretched out of shape and some of the turns may become short-circuited, thus ruining the cathode and making inoperative the tube in which it is placed.

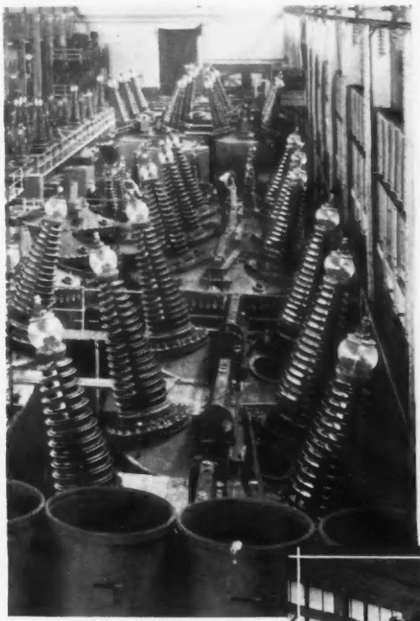
Such a defective cathode is easily detected by the usual inspection methods employed by most manufacturers, which is to place the tube on test and measure its performance characteristics. With a short-circuited cathode the tube will not work and it is rejected.

But a large percentage of the defective cathodes, as revealed by the X-ray test, if assembled in a tube, will heat up correctly, will emit, the tube will have mutual conductance and amplification, and will in all ways give evidence of being a good tube. Many of them are, in other words, almost but not quite short-circuited. They will work, but they will not last long. They are, in other words, unsuspected cripples. The jolts and jars of transportation may complete the short-circuiting of the heater coil, in which case the apparently good tube would be dead when it reached the dealer, making him wonder if the inspectors at the factory were asleep when that tube got by. But what is worse, it may still be operative when it reaches the dealer and die an early and untimely death in a user's set, causing the user to suspect both tube maker and dealer of making and selling an inferior product.

With all the painstaking care used in making cathodes, the X-ray reveals quite a large percentage of defectives. Thus the X-ray protects the user against tube failure, and the manufacturer against a bad name.

AT the left is an enlarged X-ray picture of a good cathode. At the right shows a heater coil which has been pulled or twisted out of shape until several of the turns are almost but not quite short-circuited. Except for the X-ray test, this unsuspected cripple might have gone into a radio tube

SWITCHGEAR MANUFACTURE

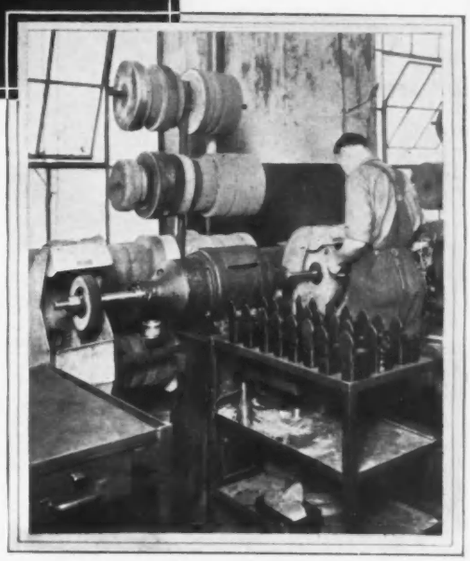


HERE (above) are made large oil circuit breakers. The largest of these breakers are used on 230,000 volt systems, and will open circuits carrying 3,000,000 or more horse power

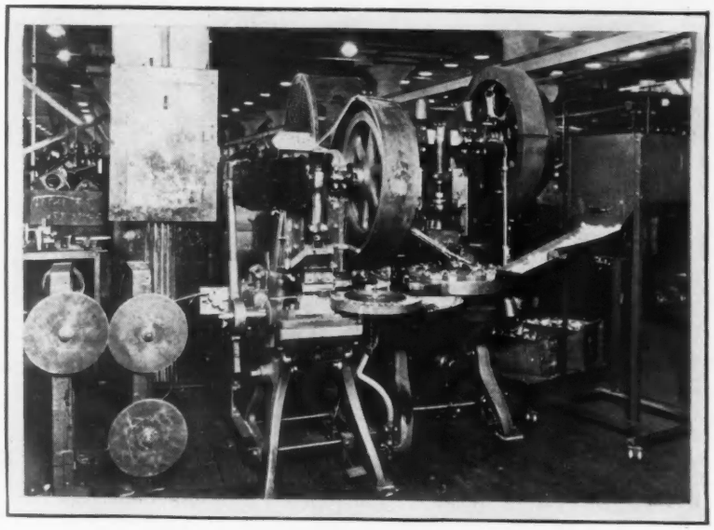
DURING the assembly of switchboards the panels are supported by a pipe support (left). As soon as all connections are complete, a factory test is made. Notice the adequate daylight and artificial illumination

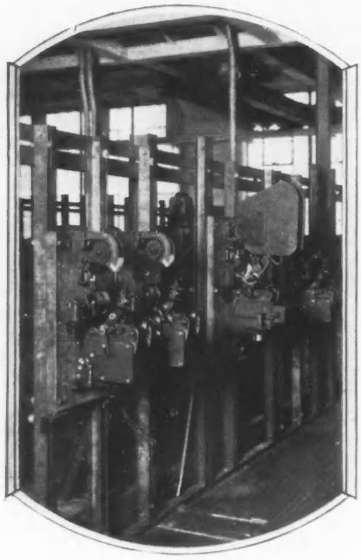
TO operate in the most efficient manner, the General Electric Company deems it prudent to decentralize departments wherever possible. Accordingly all switchgear manufacture is carried on at a separate plant, located in Philadelphia. This plant, illustrations of which are shown on this and the following three pages, is devoted exclusively to switchgear manufacturing operations

PRIOR to applying final lacquer finishes, switchgear parts are ground and polished. Grinding wheels are mounted in pairs, as shown, and the various selection of grinding and polishing wheels are arranged on a simple rack convenient to the operator. All dust is caught in a hood and carried off through a vacuum system and every precaution is taken to safeguard the health of the employees



ARRANGEMENT of machines for making contact fingers is shown at the right. Contact fingers for oil circuit breakers are made up assembled and finished in a single group of machine units arranged so as to reduce the number of movements to the minimum





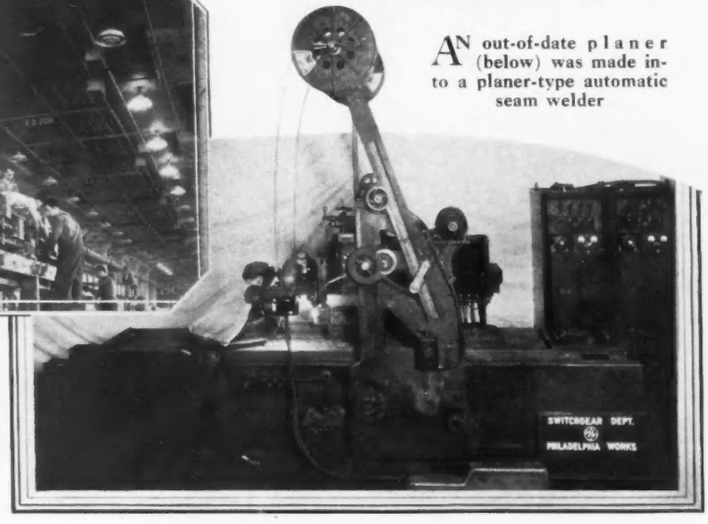
TO assemble air circuit breakers (above) the base is bolted to an angle iron supporting rack at any convenient height. Notice the brackets at the bottom of the circuit breaker base

THE switchgear plant of the General Electric Co. has a floor area of 1,162,445 square feet. Railroad tracks accommodate over 200 cars, and 4000 feet of concrete roadway permit operation of a fleet of trucks and automobiles. The personnel of this plant totals more than 4000. All of the main buildings are of fire-proof construction.

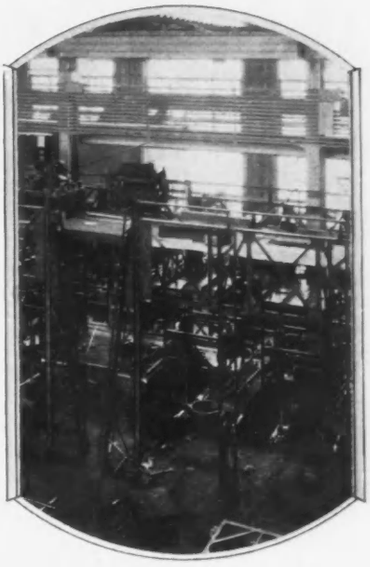
PORCELAIN insulators for varied uses are here assembled with their metal parts. These pieces range in size from tiny switch parts to insulators six to eight feet high

TRUCK-TYPE switchgear (below) has found great favor due to the exceptional safety it affords as well as the speed with which it can be installed, inspected and maintained, This type of switchgear is manufactured in complete units, and the units are equipped with wheels. Metal clad equipment (right), providing similar safety features, is also manufactured on this assembly floor

AN out-of-date planer (below) was made into a planer-type automatic seam welder



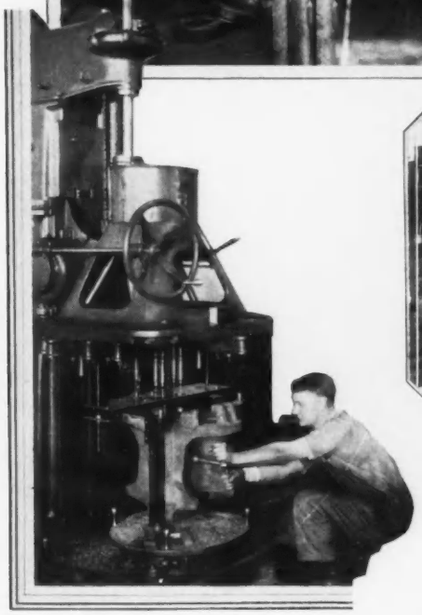
WHEREVER possible, machine tool equipment is equipped with individual motor drive (left), thus eliminating all belts and gears where practicable. This shows two drilling machines equipped with six motors each. The pieces to be drilled are held in jigs and slid along from one drill to another. Each motor is controlled individually

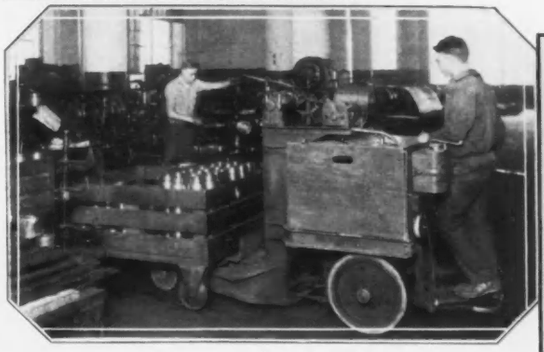


NOTICE the excellent daylight illumination in the manufacturing aisle below. Fabricated and welded elements move from welding machines in the background through machine operations to oil circuit breaker assembly

ISOLATED phase oil circuit breakers are assembled on the framework illustrated at the right. When installed each phase and the breaker units for that phase are located on separate floors of the power station

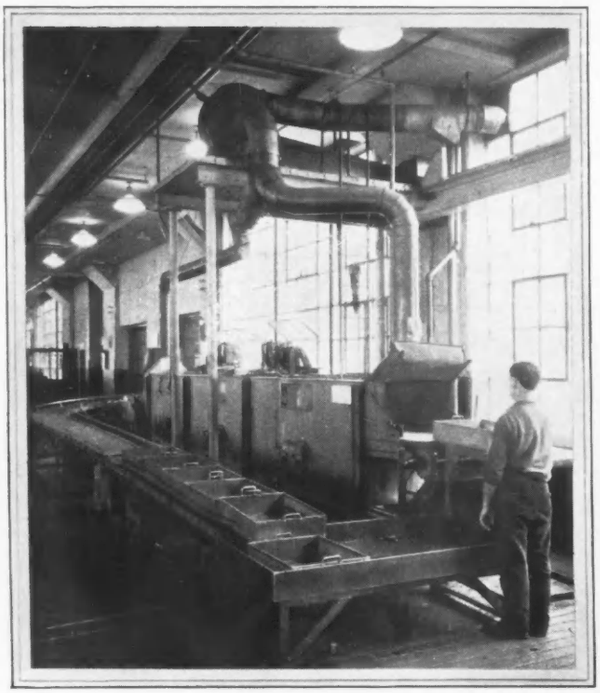
BESIDES manufacturing equipment, this switchgear plant is equipped with a large cafeteria, a medical department, rest room for women employees to use during certain designated hours of the day, and clubs and associations equipped with bowling alleys



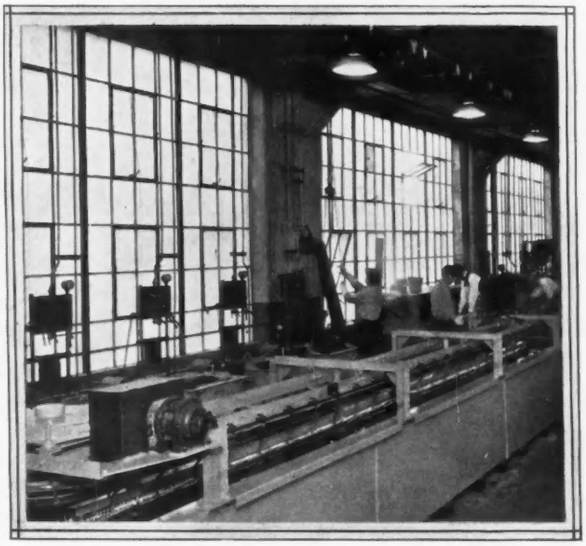


MULTIPLE drilling (left) is the rule where production warrants it. Machines are kept supplied with raw material and assembled parts by the use of skids and storage battery trucks. Smaller skids (right) are moved about by hand

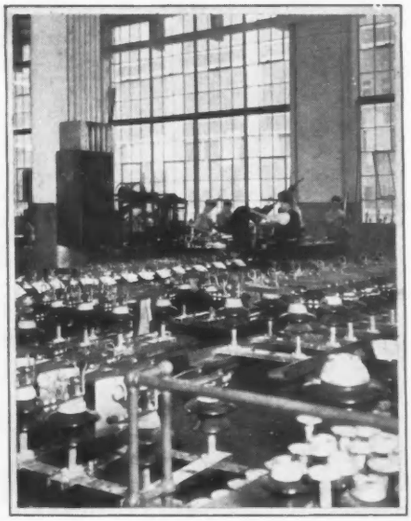
ONE of the features of the General Electric switchgear plant is a large permanent exhibit in which are gathered representative devices typical of lines now in production as well as some earlier types now superseded. There are more than 300 exhibits, including models, finished stock samples, parts, working applications, and dissected devices



HERE is a washing machine for screw parts. Notice the conveyor system with the empty trays returned to the operator

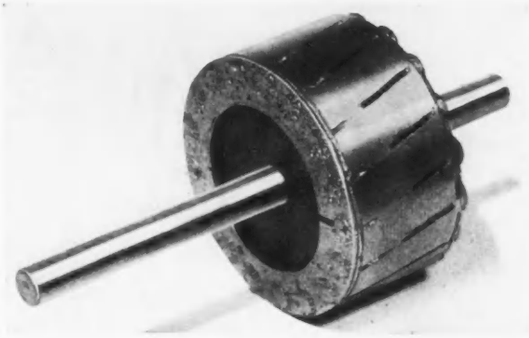


PRACTICALLY all smaller pieces of steel or iron used in switch-gear manufacture are given a rust-resisting treatment in the tanks shown above. Pieces are hung from a conveyor chain which is driven by a motor. Notice that the tank is built up of sheet metal and angle supports are welded. The speed of the motor shown is adjustable so that pieces can be given any predetermined amount of treatment in the bath. Excellent illumination is provided for this process both from daylight through tall windows and artificially by RLM reflectors



INDOOR and outdoor disconnecting switches (above) are assembled progressively, as illustrated

PROGRESSIVE assembly of relays is illustrated at the right. In this one room the relays are assembled, tested and boxed for shipment or stock



A SMALL assembled armature and shaft that has been centerless ground to close limits and concentricity

shafts are ground in one cut by the in-feed method on the centerless grinder, eliminating the centering operation. Shafts vary from three and four diameters down to shafts with one diameter with an oversize center length of 0.005 in. on which the armature is pressed.

Because the center length of each of these armatures is held 0.005 in. oversize for the pressing on of the armature, the ends are ground to 0.249 in., while the center is held to 0.254 in. Stock removal totals 0.021 in. on the ends and 0.016 in. in the middle. Master cams for truing the grinding and regulating wheels to the correct profile are provided so that the exact shape of the work can be imparted to the shaft in one cut.

A production of ten finished ground shafts per minute is obtained on this set-up. Limits for roundness are held within 0.0001 in. and for size within 0.001 in. on the ends and 0.0005 in. on the middle oversize portion.

Previous to centerless grinding a good deal of difficulty was encountered in springing of the shaft and eccentric grinding. Centerless grinding has eliminated this springing tendency.

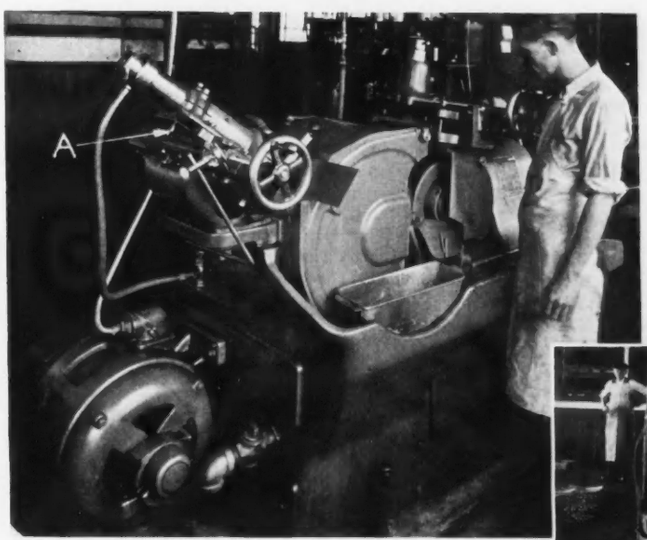
After the armatures are pressed on the shafts, they proceed to a second centerless grinder which grinds the outside diameter concentric with the shaft. The in-feed method of grinding is used, and concentricity between the shafts and armature is held within 0.00075 in. Production of two armatures per minute is obtained which is double the output obtained when these machines were ground by center-type machines.

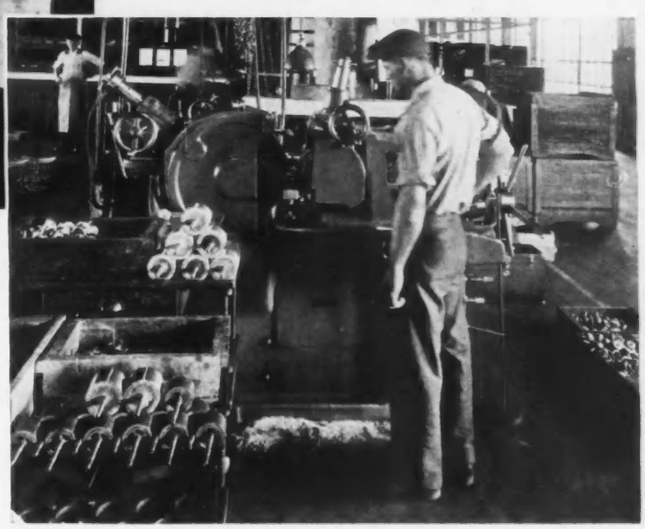
The precision limits and concentricity obtained makes centerless grinding nicely adapted to grinding of armature shafts and outside diameters.

Centerless Grinding of Shafts and Assembled Armatures

IN the plant of Robbins & Myers, Incorporated, Springfield, Ohio, shafts and outside diameters of small armatures are ground on centerless grinding machines. Two centerless grinders are used, one for grinding the small shafts and the other for concentrically grinding the armatures with the shafts after they have been pressed on.

After coming from an automatic screw machine, the





MASTER cams for truing the grinding and regulating wheels to the correct profile are provided so that the exact shape of the work can be imparted to the shaft in one cut (see above). The cam and follower used for truing the grinding wheels is indicated at "A". Outside diameters of armatures are ground concentric with shafts in the machine shown at the right

Ready to Apply

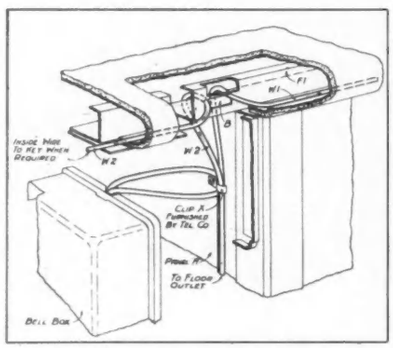
Seven liftable ideas for cutting costs or simplifying the day's work of the electrical manufacturer

Ready to Apply the Wiring

TOO often a beautiful piece of office furniture is marred by unsightly telephone wires, push-button wires and the like just as soon as it is moved into place and put to work. Because of this situation there has been developed by the Shaw-Walker Company a desk which has been electrically planned.

This desk, which is of steel, has been so designed that all signal wires vanish into concealed construction. There is even provision made so that the flat type telephone instrument coming into wide use to day may be kept in the second left-hand drawer, the wiring being from within so that there is no part of the installation exposed.

An idea of the way in which this is accomplished is given in the sketch reproduced above. L. I. T.



Stowing the Wires Away

The curved edge of the metal top of the desk serves to conceal the telephone wiring. Special slots play their part too

Off Comes the Insulation

THE wire stripper shown in the sketch is very simple to make and will find a ready use in any plant where wire ends have to be bared for connecting wires to electrical equipment. It will strip the insulation from double lamp cord as well as single wires in one simple operation, and does the work quickly and neatly.

The device consists of a sheet of 1/16-in. brass (any other metal can be used as well) 5 in. x 5 in. The sheet is bent into an angle, the upright end being 3 in. high. A slot is cut in the upright end, as shown, and four holes drilled to receive the short pieces of hacksaw blades and two holes in the base for fastening the device to the bench.

The insulation cutters are two short pieces of hacksaw blades. The ends of the blades are used, as the hole is already punched. The flat end is ground on an emery wheel to a 45-deg. angle. The blades are fastened in the holder with the two lower screws and then set to the size wire to be used for by means of the two upper screws and washers. For general use this can be given a single setting, but for large quantities of wire of the same size it is best to find the best adjustment suited to that size, as the work is turned out quicker and neater.

In use, the device is screwed to the bench, the wire with the insulation is inserted between the two cutters, which quickly cut through the insulation, and the wire given a slight twist to cut the insulation all around evenly. The other end is then given a pull, the insulation coming off instantly.

When double wire cords are to be stripped, both wires are placed in the device, care being taken that the wires are placed one above the other instead of side by side, as this would cut through the copper wire. H. R. W.

Signal Lamps Cut Idle Time

AT one plant a system has been installed which greatly reduces idle time resulting from machine breakdowns or material delays.

A green light at the desk of the timekeeper in each department flashes whenever there is any idle time in his department. Idle time may come from a number of causes—the men may be waiting for the foreman to give instructions regarding a job, waiting for material, waiting for jigs or fixtures to come from the tool storage, or waiting for cutters and tools with which to do a job. Machine breakdowns are also causes of delay.

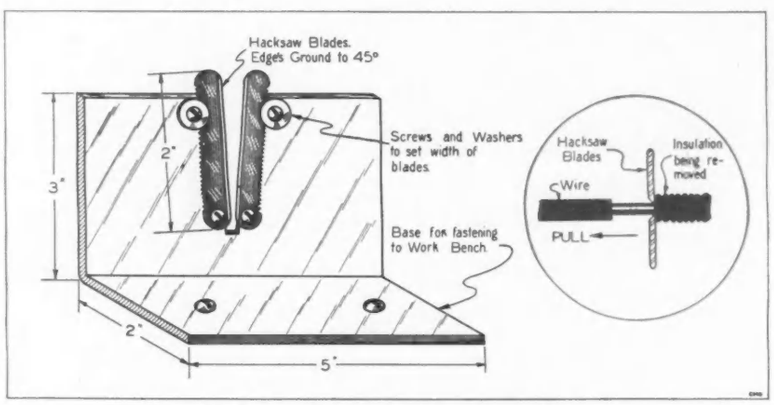
The green light is placed high above the timekeeper's desk and can be seen from any part of the department, so that the foreman of the department can be reached quickly. This green light is a signal for him to come to the timekeeper's desk immediately to find out the nature of the idle time and to act at once to remedy it. The timekeeper is promptly notified of any idleness in his department by the individual machine operator, as each operator is interested in seeing to it that his machine is working at the full capacity, for he is paid according to his production and, naturally, is interested in increasing his weekly earnings.

Although the foreman could usually be called under the old system, it was sometimes difficult to locate him, and frequently the operator had to leave his machine and go through the department looking for the foreman. Under the new system the foreman promptly responds to the flash of the light, and the idle operator can be put to work preparing for the next job or doing other productive work rather than simply walking around looking for his foreman. J. J. B.

No More Forgetting to Switch Lamps On and Off

THE eyesight and efficiency of workers is affected if someone neglects to provide artificial light when it becomes necessary to supplement daylight. On the other hand, waste occurs if the lights are left burning when not needed.

A photo-electric cell guards against both contingencies in one portion of the plant of the Westinghouse Electric & Manufacturing Company at East Pittsburgh. G. H. T.



A Simple Way to Strip Insulation

If there is any very appreciable amount of wire stripping to be done, of course, modern stripping machines provide the only satisfactory method, but for the small job this makeshift is handy and easy to make

Perhaps you too have worked out little cost-cutting plans which are of value. If so, turn them in for use in this idea-exchange—a feature appearing each month in ELECTRICAL MANUFACTURING *under this heading "Ready to Apply." Ideas accepted will be paid for at a liberal contribution rate.*

Another Use for Hack Saw Blades

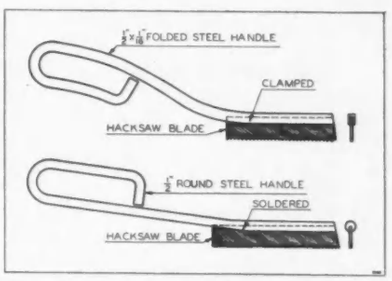
IN commutator maintenance there must be an undercutting of the mica to insure proper contact between the carbon brushes and the copper bars. It is essential that a clean, rectangular slot be obtained entirely free from mica slivers. After undercutting, a careful inspection is necessary, and all particles of mica which were not removed by the saw used in undercutting must be removed by hand.

For this purpose the hand tools sketched at the right serve well. As will be seen from the sketch, they are made from hack-saw blades. A. C. H.

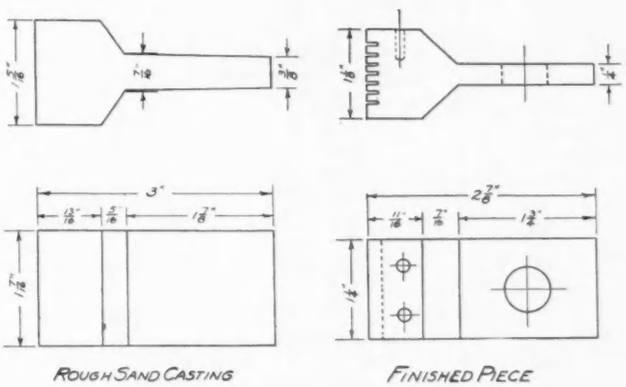
Extruded Metal Saves 60 Per Cent

ONE Eastern electrical manufacturer has made notable savings by manufacturing many of its electrical fittings from extruded copper instead of from the cast material and bar stock.

A case in point is the shunt terminal sketched below. This was formerly made from a copper casting. The castings furnished for this terminal were subject to considerable variation, and it was necessary to make them considerably oversize in all important dimensions to permit finishing the pieces to the required section.



To Finish the Undercutting Job
Here are two ways of making a tool for removing leftover particles of mica



One Way Costs 60% Less Than the Other

Formerly the rough casting of a copper shunt terminal, sketched at the left, was the starting point of the finished piece at the right which is now made from extruded bar.

	Sand Castings Finished All Over	*Extruded Shape Cut from T-Bar*
Weight per piece:		
Rough	0.97 *lb.*	0.67 *lb.*
Finished	0.61 *lb.*	0.61 *lb.*
Scrap	0.36 *lb.* (37.1%)	0.06 *lb.* (9.0%)
Costs:		
Rough piece	$0.2700	$0.2021
Scrap credit	0.0288	0.0048
Net cost	$0.2412	$0.1973
Machining	0.3584	0.0401
Totals	$0.5996	$0.2374
Savings: Per piece		$0.3622 (60.5%)

No Going Back for Tools
When a call comes in for the repairman, a lift truck is wheeled under this repair kit and off it goes to the job

The castings themselves weighed .97 lb. each, and about 37 per cent of this was removed in the machining operation, which included chiseling, filing and milling all around. Aside from the scrap loss, there was the disadvantage that the electrical conductivity was not uniform, and blow holes occurred occasionally, which had to be filled in after machining to avoid scrapping.

The use of extruded metal for this part, begun about a year ago, involves only one machining operation. That is, the cutting of a modified T-bar into pieces 1¼ in. long. This was done with a ⅛-in. milling cutter, and since the cross-section of the bar stock is identical with that desired in the finished piece, the total scrap loss prior to drilling and slotting consists only of the metal the cutter removes. Costs by the two methods are shown at the left.

This company now uses extruded material in the manufacture of numerous other parts with advantages similar to that of the shunt terminal described above. B. B. C.

Repair Jobs Completed in a Hurry

THE average repair job in a manufacturing plant calls for the services of a couple of men, a large variety of tools and considerable material. It is not an easy matter to get all the necessary tools and materials to the trouble spot unless an outfit like that shown in the picture above is in service.

Experience has taught the trouble shooting squad in a Cincinnati plant just what the repair kit should comprise, and there are very few instances when either repair man has to leave the job to get something needed.

When a call comes in for the repair men, it's a case of seizing a lift truck and starting off to the department where help is needed. The repair crew has first call on the lift truck equipment because delays mean much usually. A machine will be done and one or more operators will be non-productive while their tool is being worked on.

The repair box has proved a big time saver for the firm. T. F. M.

PROBLEMS affecting the design and manufacture of switchboard wire include electrical stability, flame resistance, appearance, workability, and life. A combination varnished cambric and asbestos insulation is gaining favor

Manufacture and Test

SWITCHBOARD wire, as commonly used, consists of 0.081 in. tinned copper wire, insulated with rubber, varnished cambric or a combination of varnished cambric and asbestos, for 600 volt service, and covered with a braid of cotton impregnated with a flame-proof compound. Other sizes and voltage classifications are used but the bulk of the wire is made up of the 0.081 in. 600 volt type.

At one time rubber insulation was used generally for this service, although recently there has been a gradual change to varnished cambric insulation which, in turn, is giving way to the combination varnished cambric and asbestos insulation.

Problems affecting design and manufacture of wire include electrical stability, flame resistance, appearance, workability and life.

Although the service voltages involved are comparatively low, usually not over 220, it is essential that the wire be constructed of materials which insure non-interruption of service due to any electrical or mechanical weaknesses.

In switchboard wiring there are many locations on the boards where numerous wires are grouped together. This produces a considerable fire hazard if some means is not provided for minimizing the inflammability of the covering for the wires. In the case of the rubber and varnished cambric insulated types, this is accomplished by impregnating the cotton braid over the insulation with a flameproof compound, which retards and localizes the action of the flame, in case a short circuit or other disturbance in the wiring system produces an arc or flame.

How the Wire Is Further Flame-proofed

The combination of asbestos and varnished cambric insulated wire in addition to being protected by the impregnated cotton braid overall, is also further flame-proofed by the asbestos which is applied between the braid and the varnished cambric.

The selection of a proper flameproof compound for the braid is important, as some compounds, while being flameproof, are also hygroscopic or otherwise unsuitable. For this reason, it is advisable to provide electrical or other suitable tests for wire of this kind. This is discussed later. A common means of providing a non-hygroscopic finish is to apply a light wax coat over the braid after flameproofing. This does not interfere seriously with the flame retardant and yet provides a seal against the entrance of moisture.

The appearance of a switchboard wire is very important, due to the high standards of neatness in vogue in station layout and equipment. The compound used in the braid determines to a large extent the appearance of the completed wire and for this reason the following items are mentioned as an aid in obtaining a neat appearing wire. The compound must fill the interstices between the threads in the braid, producing a smooth, sleek finish which will not powder off when used or "dust" into the eyes of workmen on overhead wiring. The compound must have enough body to hold the braid together when the wire is cut for terminals, etc.; otherwise, frayed, unsightly ends will result. If the braid saturant is not applied sparingly it will flake off when the wire is used.

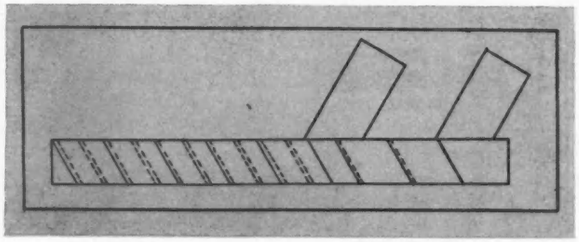
Ordinarily, the braid on switchboard wire is finished in either gray or black. Other colors are available for those who desire them, including red, blue, green, yellow, orange, brown, pink and white. The colors just mentioned are obtained by the use of colored flame-proof compounds. It is also possible to use colored threads in making up the braids. This permits the use of two or more different colors in the same braid which greatly increases the number of different color combinations possible. For wires using colored cotton braids, a clear, transparent flameproofing compound is used which does not blur the colors in the braid.

Rubber insulated wire is perhaps the most workable of the three types. A separator, usually of cotton, must be used between the tinned wire and the rubber insulation to facilitate the removal of the insulation and braid for terminal connections, etc. Ordinarily, rubber insulation meeting the standards of the National Board of Fire Underwriters is used, although, where the extra expense is warranted, a 30% Hevea rubber compound is used.

Varnished cambric insulated wire is used extensively for this service. The use of yellow or black varnished cambric is optional. However, the aging qualities of the yellow are inferior to those of the black, due to the presence of more ingredients which oxidize during the lapse of time. The black varnished cambric will retain its flexibility for much longer periods than the yellow. This is important where the wire is liable to be carried in stock for some time before it is used. Yellow varnished cambric becomes hard and brittle, and when the wire is bent, it is very likely to crack. The National Board of Fire Underwriters require the use of a separator on wires or cables insulated with yellow varnished cambric. This adds to the cost of the wire and serves no useful purpose in the wiring operation as the tapes are easily removed.

The Function of a Lubricant in Wires

The use of a little petrolatum between the varnished cambric tapes provides a lubricant for the tapes when the wire is bent. It must be used sparingly, however, or it will bleed from the end of the wires on vertical runs and the inflammability of the insulation will be increased.



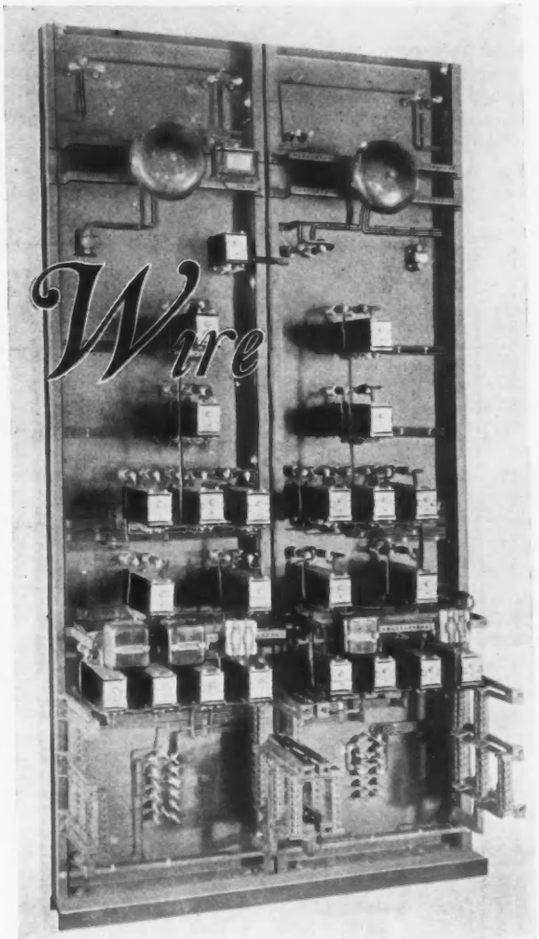
APPLYING the tape in one direction with each lap properly broken gives the maximum creepage distance between the conductor and braid. In actual practice, however, it is difficult to apply the tapes with the joints broken properly and with the necessary lap

Electrical Manufacturing, July, 1930

By J. R. Becker

Materials Engineer, Westinghouse Elec. & Mfg. Co.

Wire of Switchboard



THIS is the rear view of a modern switchboard, showing the latest wiring method known as "channel" wiring. When wiring by this method, the long vertical runs of wire are satisfactorily concealed in the side channels of the steel boards, therefore making only the short horizontal runs visible

The thickness of the tapes should be between 0.005 in. and 0.013 in., as these limits have been established by the National Board of Fire Underwriters. The widths of the tapes may, and usually do, vary between the different layers on the wire, being narrowest nearest the conductor. The lay of the tapes is very important as a short lay is necessary to provide sufficient flexibility for bending. On 0.081 in. (No. 12 B&S Gage) wire a length of lay of 1.00 in. should not be exceeded; ¾ in. being better. The lap of the tapes should not be less than 1/16 in.

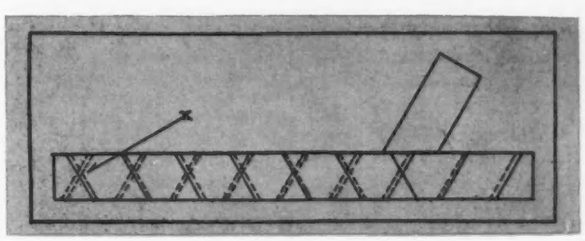
There is some question as to whether or not it is advisable to apply the varnished cambric tapes all in one direction.

How Best to Apply Cambric Tapes

Theoretically it is probably best to apply them all in the same direction with each lap or joint properly broken. This gives the maximum creepage distance between the conductor and braid. In actual practice, however, it is difficult to apply the tapes with the joints broken properly and with the necessary lap.

Reversing the direction of each tape, on the other hand, eliminates the problem of breaking joints properly but provides a satisfactory insulating medium only if the tapes are lapped sufficiently to remain closed when the wire is bent. If a proper lap is not used, a direct path through the insulation is produced.

In the illustration below is shown a wire insulated with two varnished cambric tapes applied in reverse direction and lapped. If the tapes were not lapped, no insulation would be provided where the cross-overs occur (point X for example). The illustration opposite shows a wire insulated with two varnished cambric tapes applied in the same direction with the joints properly broken and lapped. If the joints were not broken and a proper lap were not used, there would be no insulation at the edges of the tapes.



REVERSING the direction of each tape eliminates the problem of breaking joints properly, but provides a satisfactory insulating medium only if the tapes are lapped sufficiently to remain closed when the wire is bent. The lap insures insulation at point "X"

Due to these various difficulties, it is probably best to wrap both tapes in the same direction on wires where two tapes are used, while on wires insulated with a greater number of tapes, reverse every pair of tapes, i.e., two in one direction; two in the opposite direction, etc.

The results of an analysis of five lengths of varnished cambric insulated switchboard wire from as many manufacturers is given in Table A. It will be noted that there is a wide variation in the construction of these wires, especially with respect to the number and thicknesses of the tapes and the lay of the tapes.

These lengths were each subjected to a series of electrical tests in order to determine their relative values for switchboard wiring. The results of these tests are given in Table B and show that sample number five is by far the best suited for switchboard work.

Although these dielectric values are far in excess of the actual service and test voltages encountered, it is desirable to use insulated wire which provides a generous safety factor. A dielectric strength before installation of 20,000 volts minimum and a dielectric strength of 10,000 volts minimum after being bent 90° (around a radius equal to one-half the diameter of the wire for .081 in.) is sufficient for most purposes.

A more recent design in switchboard wires consists of an

insulation composed of asbestos and varnished cambric, covered by a flame-proofed cotton braid. Usually three varnished cambric tapes approximately 0.006 in. in thickness are applied to the tinned copper wire. Over the varnished cambric is placed a tight roving of asbestos fibers, saturated with a flameproof and moisture-resisting compound. The usual cotton braid is then placed over the asbestos. Originally, an asbestos braid was used but a rather bulky, unattractive and expensive wire resulted.

RESULTS of an analysis of five lengths of varnished cambric insulated switchboard wire from as many manufacturers are given in this table. It will be noted that there is a wide variation in the construction of these wires, especially with respect to the number and thicknesses of tapes

TABLE A

Sample Number	Diameter Copper Wire	Diam. Over Insulation Average	Thickness of Insulation Average	Diameter Overall—Average	No. of Tapes	Thickness of Tapes	Average Thickness of Tapes	Width of Tapes	Lay of Tapes	Lap of Tapes	Petrolatum	Application of Tapes
1	.0816	.1700	.0442	.213	1	.0077	.0076	5/8	1 1/2	1/8	No	CCW**
					2	.0077		1/2	1 1/2	1/16	No	CW*
					3	.0080		3/8	1 1/2	No	No	CCW
					4	.0070		3/8	1 1/2	1/32	No	CW
					5	.0077		3/8	1 1/4	1/16	No	CCW
2	.0810	.1750	.0475	.245	1	.0070	.0073	9/16	7/8	3/32	No	CW
					2	.0080		5/8	1 3/8	1/8	Yes	CCW
					3	.0072		5/8	1 1/8	1/8	Yes	CW
					4	.0070		1/2	1 3/8	1/8	No	CCW
3	.0800	.1900	.0550	.240	1	.0125	.0123	5/8	1 3/4	1/16	No	CW
					2	.0125		5/8	1 7/8	1/8	No	CW
					3	.0120		1/2	1 3/4	1/8	No	CW
4	.0813	.1830	.0509	.249	1	.0065	.0068	3/4	1 1/16	1/8	No	CW
					2	.0072		1/2	3/4	1/8	No	CCW
					3	.0065		1/2	3/4	1/8	No	CW
					4	.0070		3/8	3/4	1/8	No	CCW
					5	.0062		1/2	1 3/4	1/8	No	CW
5	.0810	.1850	.0520	.250	1	.0125	.0131	1/2	3/4	1/16	Yes	CW
					2	.0127		1/2	3/4	1/16	Yes	CW
					3	.0140		3/8	3/4	1/16	Yes	CCW

*CW = clockwise. **CCW = counter-clockwise. All dimensions in inches.

Due to the fact that it is impracticable to increase the dimensions of the asbestos and varnished cambric insulated wire over the ordinary rubber or varnished cambric insulated types due to wiring standardization, appearance, etc., it is necessary to sacrifice a portion of the varnished cambric in order to provide room for the asbestos. This reduces the dielectric strength, as asbestos, of course, does not have the dielectric qualities of varnished cambric. It is possible, however, to obtain this type of wire which will show on test 20,000 volts minimum dielectric strength conductor to metal foil. As we have stated before, this is ample for the service.

It is anticipated that this type wire will come into general use for switchboard wiring. The National Board of Fire Underwriters have approved it for this service.

Switchboards are ordinarily tested at twice the operating voltage plus 1000 volts between the wiring, and ground. This test imposes a maximum test voltage of 2200 on 600

(*Continued on page* 84)

TABLE B

Preparation of Samples	Sample Number				
	1	2	3	4	5
	Kilovolts—60 Cycle				
(a) As received	23	38	31	25	31
(b) Wire bent 90° around 1/8" radius	12	22	25	6	31
(c) Wire bent 90° around sharp radius	3	10	5	5	29
(d) Voltage applied across 2" of braid to breakdown	24	29	29	27	31
(e) Same as (d) except sharp 90° bend	19	26	21	22	25

THE same five samples were subjected to a series of electrical tests in order to determine their relative values for switchboard wiring. The results (shown here) indicate clearly that sample number five is by far the best suited for switchboard work. Results (a), (b), (c) are average of 15 tests each, and (d) and (e) are averages of five tests each

Thinking It Out
With the Editor

Tariff or No Tariff, We Forge Ahead

THE new tariff is not going to hurt the industry materially. As one electrical manufacturer has put it, we can depend upon the enterprise of the American manufacturer, especially by increased productive efficiency, to offset whatever handicap exists in the new tariff rates.

Every six months there is conducted jointly by the National Conference of Business Paper Editors and the Associated Business Papers a survey of business conditions. First in the list of questions recently put to business paper editors in all lines of industry was one reading, "What reaction to the new tariff, if any, do you notice in your industry, trade or field?"

The replies are significant. Out of 33 answers only eight could be interpreted as at all negative, and of these only two are distinctly characterized as "unfavorable." A brief summation of all the replies gives this: no reaction to the tariff, 21; favorable, 1; neither way, 1; will be adjusted, 1; not as bad as feared, 1; discourage imports, 1; exports adversely, 4; still apprehensive, 1; unfavorable, 2.

"Indifferent," "Negligible effect," "Will neither make nor break industry"—these comments contained in the detailed replies of some of the editors indeed seems to express fairly well the composite opinion of industry as a whole insofar as is revealed by this rather comprehensive survey.

That there is much the same apathy on the new tariff within our own industry and hence no ill effects to be expected by it seems evident from the replies received from 45 telegrams which ELECTRICAL MANUFACTURING sent to manufacturing executives in the industry.

Indeed a considerable proportion of them said in effect that they were not sufficiently conversant with the new rates to comment intelligently. Therefore, the editor conceived it to be a service to cull out of the mass of facts embodied in the Tariff Act of 1930 the rates on various materials used by the electrical manufacturing industry and compare them with the old rates. This tabulation begins on page 35 of the issue you now are reading.

Study these carefully and the probable conclusion will be that the electrical industry in common with most others will have little to fear from the Tariff Act of 1930. It should prove no marked deterrent to the normal betterment of business conditions.

◇ ◇ ◇

"Safety Engineering"

PROMPTED to do so by an article in ELECTRICAL MANUFACTURING which attributed to engineers a considerable degree of managerial ability over and above their purely engineering capabilities, a reader—an engineer himself—writes us this bit of engineering heresy. "Engineers," he says, "are primarily designers of devices which will save their own necks. All engineering is safety engineering. Detroit is learning how to handle engineers. The theory there is that engineers grow stale and need firing about every three years. Otherwise they dig in, make no changes and prepare to die on the job."

It is to be seriously doubted if this correspondent himself believes this statement literally or in its entirety. He is merely indulging in the Menken manner to give vividness to his point.

And that point, stripped of its specific application to engineers, it seems to us, is that executives, as a whole, having gotten themselves into positions of some eminence in the organization scale, are in grave danger of unconsciously facing every decision from a "let well enough alone" point of view.

Or, what is worse, there may even be a cool calculating approach to this "digging in" process. But whether conscious or premeditated the results are the same.

Mental entrenchments of this sort are not as safe as they seem on the surface—at least not to the companies and organizations upon which they are practised. Thus it is that long established concerns which have enjoyed years of accumulated good-will and do a huge business sometimes shrivel up while the little plant next door grows big and prosperous. Digging in on the one hand. Driving ahead into new territory on the other.

Engineers are by no means the only ones who may be accused of following the short-sighted policy of "designing to save their own necks" at the expense of their companies.

◇ ◇ ◇

The Place of the Constructive Faultfinder

GENERALLY the faultfinder is looked upon as a nuisance. But is this a fair judgment? Indeed the faultfinder may be worth several silently obedient, willing workers.

Complaints frequently lead to betterments in an organization and in a plant. And generally it is the faultfinder who brings complaints to the front, focusing attention upon evils, and not the meek employee who will put up with anything.

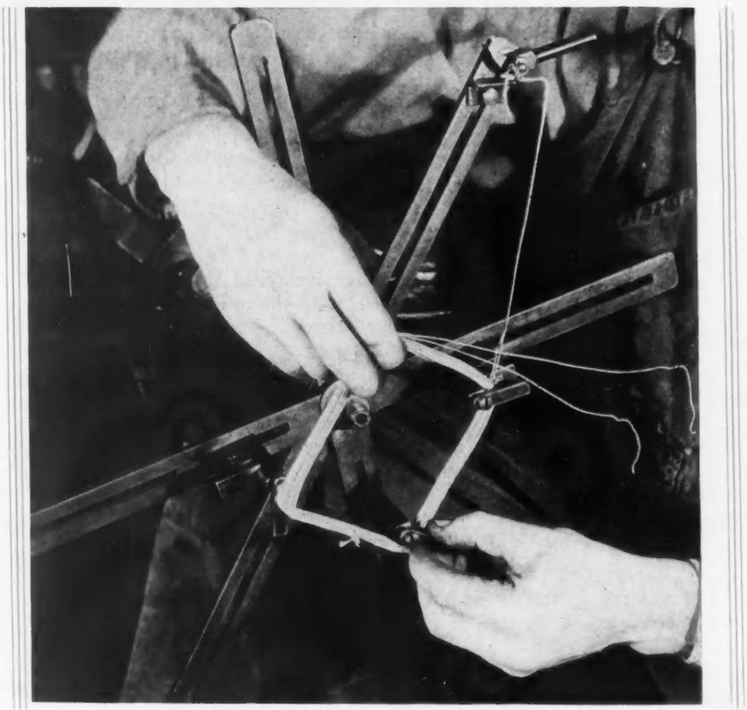
Thus it is that abuses get corrected that much more speedily. Not by any means are all complaints mere idle wailings. Often they are very poorly expressed and only half told, but it is poor management not to give ear to them and seek out the kernel which more often than not exists.

L. I. T.

On A "Home

*ANY motor repairman can build the coil winding machine illustrated and described on this and the following three pages. This machine was built entirely in the small shop of Wendell Szabados, a Brooklyn motor repairman**

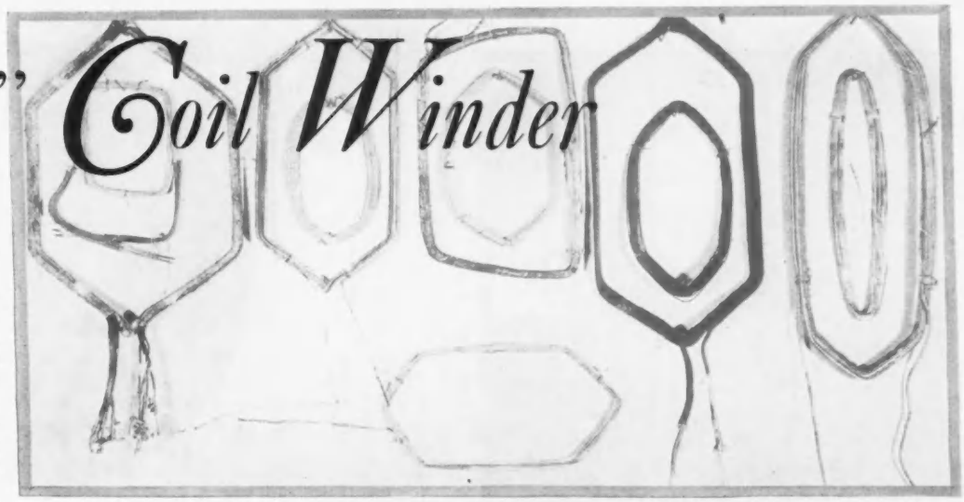
ALTHOUGH the machine is now operated by hand (above), Mr. Szabados has made complete plans for running it with a motor. With this new drive it will be possible to run the winder at practically any speed, and it will be so controlled that after winding a predetermined number of turns it will stop itself



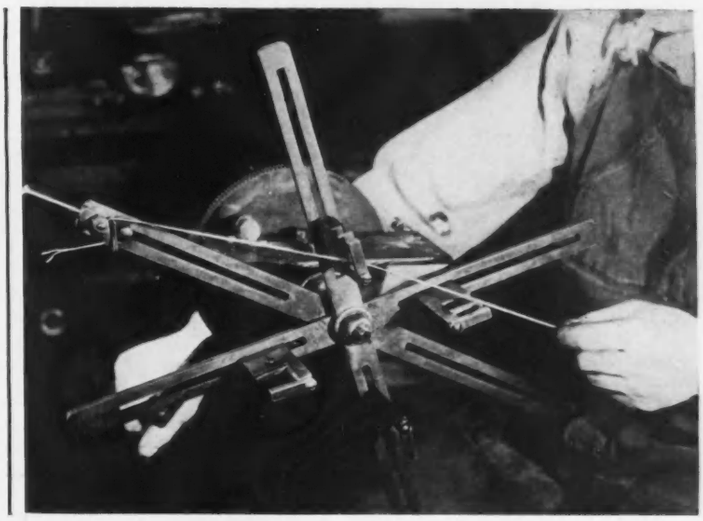
REMOVING coils from the frame is a simple matter. Notice the simple guides (right) which hold the wire in place while the coil is being wound. The thumb and forefinger of the operator's left hand are turning back one of these guides so the coil can be removed. Coils are tied before they are removed from the frame

**Anyone desiring further detailed information about this machine may obtain it by addressing the Editors.*

Made" Coil Winder



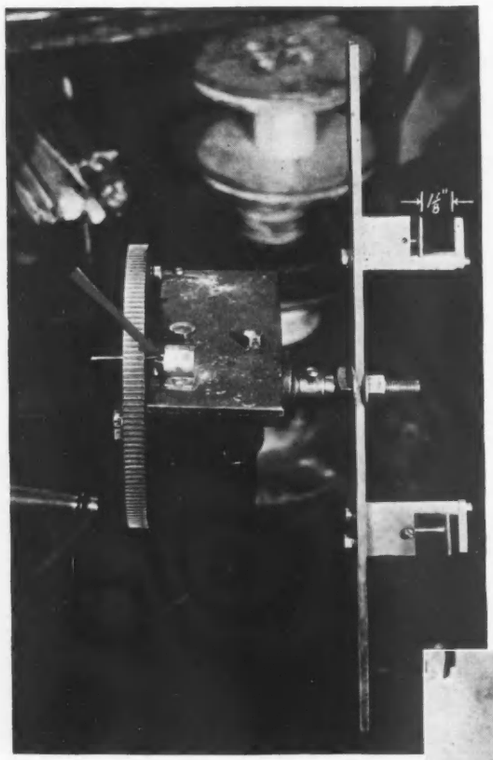
THIS gives some idea of the many kinds and sizes of coils that can be wound on the machine here described. Mr. Szabados finds such a machine a great time-saver because it makes it unnecessary to make special forms for odd coils



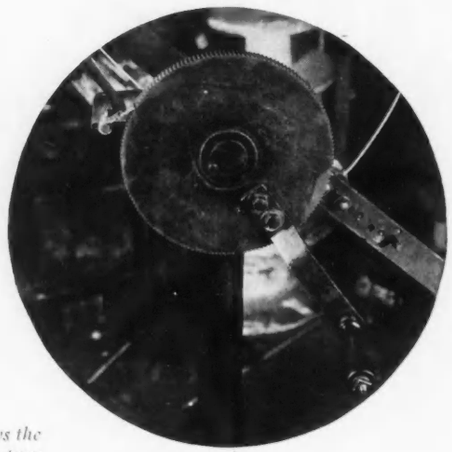
THE operator (right) has just begun to wind a small square coil. Coils of this type measuring up to seventeen inches square can be wound on this machine. The winding frame consists of three slotted cross bars that can be put at any angle to each other. In winding a square coil, the wire is first attached to the odd bar, as shown in the illustration below

DIAMOND type coils for motors up to fifty horse power can be wound on the machine here described. Special frames could be provided for winding coils much larger. When the machine is operated by hand it requires approximately one minute to wind a seventeen turn armature coil. Mr. Szabados estimates that about half this time will be required when the machine is motor operated.

Most of the coils made on this machine are made to match burned out coils coming from machines to be repaired, so that the winding problem is that of matching coils rather than designing them. First the old coil is carefully measured, and the winding frame is set to conform to these measurements as closely as possible. Then a coil is made and tried in the machine to be repaired. Adjustments are made to compensate for errors and the other coils are wound.

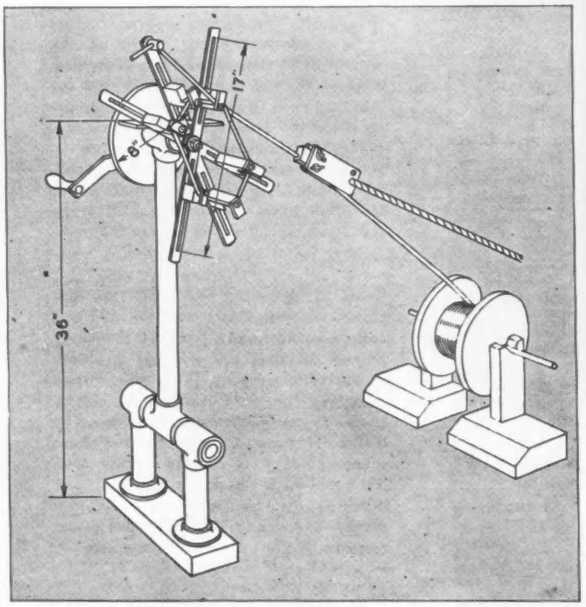


THE arrow shows the mounting of the turn counter. This is placed so it can be easily read by the operator as the coil winding progresses. Notice that the guides for the coils are adjustable up to 1⅛ in.



THE ratchet wheel for this machine was taken from a silk weaving machine. The ratchet is shown by the arrow. A smooth wheel with an eccentric stop could be used as well as a ratchet wheel

FOR ribbon coils and coils of large size, the long single bar illustrated at the right is used. The two guides in this case are made from a solid cylinder of brass grooved in a lathe to the proper thickness and depth. Mr. Szabados has a set of these bobbins for different sizes of coils. The coil is wound, tied and taped and then formed on special forming blocks made in the shop

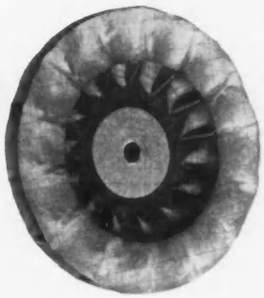


TENSION of wire in the coils is kept constant by passing the wire between two plates of soft fibrous material clamped together between wooden blocks with wing nuts (left). A rope is attached to one of these blocks and is made fast to a hook in the wall behind the coil of wire (above). The tension of the wire can thus be varied at will

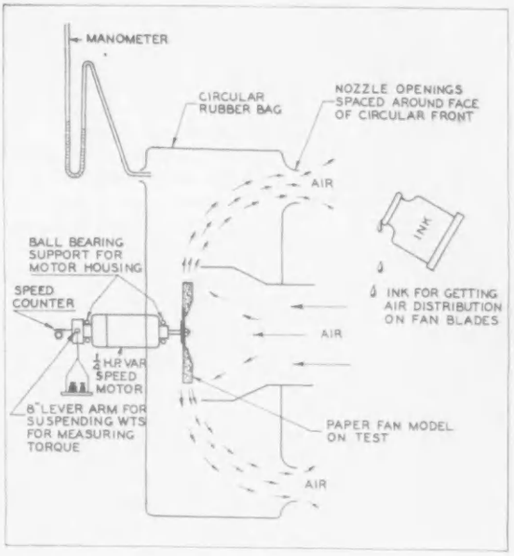
How to test out motor-ventilating fans with paper models is explained

By H. N. BLACKMON

General Engineer,
Westinghouse Electric & Manufacturing Co.



Colored ink placed in the inlet air traces the air distribution over the various parts of the blade



A stroboscope shows rigidity of the blades, a dynamometer measures torque and a manometer the pressure

"The Proof of the Pudding—"

FLIMSY paper models, simulating the sturdy cast-iron centrifugal blowers ordinarily used to ventilate industrial motors, give a quick, accurate and inexpensive check of comparative characteristics of different types of fans. Colored ink, placed in the inlet air, traces graphically the air distribution over the various parts of the blade. A neon lamp, flashing once each revolution of the blower, shows the rigidity of the separate blades during test. An electrical dynamometer and balance arm measure the torque expended; and an alcohol manometer indicates the pressure created by the revolving blower.

Electric motors can do more work if kept cool. Industrial motors run in either direction and necessarily have blowers with straight radial blades, usually of cast iron and of fairly heavy sections. Such blowers are inherently inefficient and of low capacity.

A COMPARISON of the action of the various paper models tells which type of centrifugal radial blower is best fitted to cool electric motors. The models differ by presence and absence of rotating shroud rings, number of blades, cross-section of blade, and shape of blade. An 11-in. diameter is used and a 1-in. blade width.

Each blade is made from ordinary 2½ mil (0.0025-in.) paper, cut and folded to shape; and then this hollow box is inverted and glued in place on a flat disc of 0.0025-in. (thick) paper which forms the hub of the fan. At rounded, or irregular, corners the flaps are fringed before pasting, to give a smooth fit. The paper blades are accurately spaced so a stroboscope can be successfully used to watch the individual blades at work. Irregular spacing produces a blurred image under the winking stare of the neon lamp.

THE testing apparatus is shown in the sketch. A ¼ hp. shunt wound adjustable speed motor drives the paper model at any desired speed up to 3000 r.p.m. Ball bearings support the motor housing which acts as a dynamometer; the torque is measured by a balance arm attached to the motor housing and weights. Four weak coil springs serve as flexible power leads to the motor. A tiny shaft extension drives counter for accurately measuring the r.p.m.

The models of blowers rotate inside a large rubberized bag, representing a motor housing. Air enters axially, passes the blower and exhausts through a number of nozzles. Pressure, inside the bag, is measured by an alcohol manometer.

During a test run, black ink placed in the entering air spreads over the side of the blades showing air distribution and shock load of the air. If the fan is reversed, red ink in the ingoing air leaves its trace on the other side of each blower blade, which tells a graphical story after the blower is removed from test. Of course, allowance must be made for the higher inertia of the ink particles as compared to air.

Centrifugal radial blowers, to be fabricated instead of cast, are studied by using models made of 3/32-in. cardboard. Here, the stiff sheet is comparable to the thin structural metal which is welded to make the actual blower.

This simple and economical method of comparing centrifugal blowers is giving practical results.

Study Your

IF you are desirous of securing your portion of the growing trade with the countries that lie south of the Rio Grande, their likes and dislikes, manner of purchase and methods of payment must be conscientiously and constantly studied.

In establishing your export policy, therefore, the first thing to take into consideration is WHO WILL BUY YOUR GOODS AND HOW.

Buying conditions in all Latin-American countries are different from those in the United States, and vary enormously between different countries, so that each becomes a problem in itself, but while these differences are of importance, there are certain generalities that apply and buyers may be divided into several groups, as follows:

Who Are the Foreign Buyers of Your Product?

1. *Wholesale importers,* who purchase for resale to retailers, or to the government departments, engineering and mining companies, electrical concerns, fruit companies, railroad and steamship lines, sugar and other mills, etc.

2. *General importers,* who buy goods and sell both at wholesale and retail.

3. *Retailers,* who import direct and sell to consumers.

4. *Shopkeepers,* who secure their supplies from the general importers, wholesale importers, or through commission agents, or exclusive agents.

5. *Exclusive agents,* who represent the manufacturer in the United States or Europe, and sell usually at wholesale, but sometimes at retail.

6. *Commission agents*—residents of the country—who take orders on a commission basis for direct shipment to wholesalers, retailers, government departments, engineering and mining companies, electrical concerns, fruit companies, railroads and steamship lines, sugar and other mills, etc.

7. *Miscellaneous importers,* such as the government departments—both state and national—public works departments or contractors, private parties—whose annual purchases are sufficiently important to warrant direct importation. Many of these buy through the exclusive agents or commission agents. Other miscellaneous importers are the mining companies, railroads, steamship lines, sugar and other mills, manufacturing plants, etc., who buy on contract, sometimes placing their orders locally, but more often making their purchases in the United States or Europe through the head offices located in those countries. There are large numbers of companies of this kind which are financed by American or European money, owned and operated by foreign interests, whose purchases are made in America or Europe, and which must be approached through their home offices, located usually in New York, London, or one of the larger Continental cities.

Where the Department of Commerce Can Help

The electrical manufacturer who is interested in this trade should secure a list of such companies from the Department of Commerce, which he should supplement by lists secured from the associations covering the different trades, and such other sources as may come to his attention. They will then be approached, in the usual way, through their American head offices.

No one selling method will be found satisfactory in all circumstances, as conditions vary in the different countries, and different materials must be handled in a diversity of ways.

Roughly we may divide electrical products which are exported to Latin America into the following classifications:

Group 1. Electrical insulated wire, cables, etc.

Group 2. Lighting generators, dynamos and motors, rectifiers, switchboards, switches and circuit breakers, armatures, commutators, transformers, fuses, fuse blocks, sockets, etc.

Group 3. Metal filament and carbon lamps.

Group 4. Telegraph equipment, telephone instruments, alarms and signaling devices.

Group 5. Radio installations and receiving apparatus.

Group 6. Wiring devices, ignition equipment and electrical devices for automobiles.

Group 7. Electrical measuring instruments, meters, recorders, etc.

Group 8. Miscellaneous electrical goods—household appliances, electric fans, heaters, stoves, elevators, signs, batteries and the thousand and one products that cannot be covered by the general classifications.

Group 9. Complete installations for electric lighting or power, or hydroelectric development.

In approaching our prospect in these different lines, various methods may be outlined, and here we come upon certain differences in export selling which are not found in domestic commerce. The various selling systems are as follows:

1. *Traveling salesmen,* the personal representatives of the manufacturer, who are thoroughly familiar with the com-

Latin American Buyers

Advises WILBUR T. GRACEY

Twenty-five Years American Consul Abroad

ARTICLE 3—of a series on exporting electrical products to Latin America. In this article the author discusses the likes and dislikes of the Latin American peoples, their manner of purchase and method of payment. In detail the various groups of buyers are discussed, including wholesale importers, general importers, retailers, shopkeepers, exclusive agents, and commission agents

pany's product and visit such places as may be determined prior to their departure.

2. *Local agents*—usually covering a limited territory—sometimes carrying several, or many different kinds of goods.

3. *General agents,* located in the most important center, or centers, and operating through local agents appointed by him in various cities.

4. *Combination travelers,* personal representatives of several manufacturers in non-competing but allied lines, who pool their interests and divide the costs.

5. *Export houses,* with headquarters in the United States —usually in New York or San Francisco—who have their branch offices and agents in the Latin American cities.

6. *Export agents,* usually located in some American city, working on a commission basis, representing many manufacturers, and sometimes making periodical visits to the Latin American countries.

7. *Foreign export houses,* usually having their head offices in London, Paris, Hamburg or some of the other large Continental cities, with branches or agents in Latin America.

All of these sales routes have their advantages and disadvantages. In the short space allotted me in this article I cannot go into these, but reference to any of the books on exporting recommended in my former articles will give this information in detail, and the new exporter will have to use his judgment in deciding which will be the most satisfactory for his purposes.

Generally speaking, owing to the distance from the United States of Latin American countries, selling direct from the factory to a number of different importers is complicated. It has become the custom, therefore, for manufacturers in the electrical trade to establish their own offices abroad, sell to one importer or distributor exclusively, or appoint a commission agent who will take orders for delivery to a number of importers and more or less superintend the deliveries.

It is, of course, necessary in the electrical trade, to secure representatives with the proper technical knowledge, and in the case of those groups which cover what might be called the "raw products" of the industry, such representatives must be supplied with stocks in order to fill immediate demands.

Most of the larger American and foreign electrical concerns have their branch offices in most of the countries of Latin America, and it is very unlikely that any firm would be able to place orders for complete installations of lighting equipment, telephone, telegraphs, or the like unless they had a highly trained technical staff on the spot.

Local Representation Is Needed

In the case of exporters of products that fall under groups 1, 2, 3, 4 and 6, personal representatives of the factory, or local general agents are necessary. The commission or local agent may at times be able to secure small individual orders for wire, cable, generators, dynamos, motors, wiring devices, etc., for delivery to the local consumer, or local dealers for resale in small quantities, but manufacturers expecting to secure business in substantial quantities will have to be locally represented in some way. This is particularly true as regards governmental contracts, as the specifications relative to such purchases are usually complicated.

In the radio line, these remarks apply as well in the case of broadcasting installations, but for receiving apparatus a traveling salesman making periodical visits may secure orders from local dealers for direct shipment. Even in this line, however, it is usual to appoint a general agent for each country, or perhaps divide the country into two or three territories and appoint two or three general agents.

In planning your export department all of these suggested methods of selling should be taken into consideration, as it will be found that usually one or more methods will best suit the country under consideration.

The export house in the United States may, at times,

prove to be the solution of the problem for the small exporter, or even the combination representative may be found satisfactory.

In working with the export houses various discounts will become necessary to take care of the profit which will be expected by the export house, the foreign distributor, the importing agent and the retailer.

Where the probable volume of sales does not warrant an exclusive traveler, or representative, smaller manufacturers may find the combination traveler entirely satisfactory.

It is, of course, not easy to find the right person to act in the capacity of representative. Such a man must be familiar with Spanish—and Portuguese as well if he can be discovered—should have had experience in dealing with Latin people, be familiar with their point of view, and should above all be gentlemanly and diplomatic. In addition he must be thoroughly posted regarding the article he is to sell. As he is to handle several kinds of products of a non-competitive character, it is almost impossible to find a man who has, through past experience, become familiar with all of the lines, and it is therefore necessary to discover someone with adaptability who will be quick to acquire a sufficient knowledge of your product to make a respectable showing. He cannot be an expert in every line he handles and his ability to quickly grasp the main essentials of your line becomes of first importance. He must also be of undoubted integrity and have a certain amount of dignity.

"THE quick-witted 'go-getter' who tries to put something over on the Latin American, under the impression that he is uneducated and unfamiliar with business methods, is doomed to failure," warns the author. "The Latin American is quick to spot any uncouthness, and high-powered salesmanship finds no place with Southern conservatism. Simple sincerity in making claims is most essential in gaining the friendship and confidence of these southern peoples."

The quick-witted "go-getter" who tries to put something over on the Latin American, under the impression that he is uneducated and unfamiliar with business methods, is doomed to failure. The Latin American is quick to spot any uncouthness, and high-power salesmanship finds no place with Southern conservatism. The more simple and sure he is in his statements; the quicker he is to admit that he does not know when points come up with which he is unfamiliar; in fact the more honest and straightforward he is in making his claims, the more probability there is of his becoming *persona grata* and "coming home with the bacon."

Your principal competitors in the electrical line in all Latin America are British and German firms. The former have local representatives—or branch offices—who have been long established, who are thoroughly conversant with the trade and have gained the confidence of the Latin American people by working along ultra-conservative lines.

How the Germans Succeed

The Germans, who are also strongly intrenched, depend more on intensive individual efforts; highly specialized organization of manufacturers in the electrical line in Germany, syndicates of competing manufacturers who apportion output and fix prices, and close cooperation between their bankers and the manufacturer's foreign representatives. The intimate knowledge of the German banking institutions regarding foreign purchasers and their standing in the community makes it possible for the manufacturers to offer liberal accommodiations which are not always possible for American firms, though this condition is improving continually and through our larger banks now established in Latin America, we are able to secure accurate information regarding commercial conditions abroad, and the credit status of dependable firms.

European trade with Latin America, especially German, has been aided by schools of commerce in which prospective salesmen are given scientific instruction, taught the local customs and characteristics of the Latins, and trained in the details of packing, invoicing, shipping, routing of goods, etc., and they are able to take advantage of this knowledge in quoting prices. It is one of the disadvantages under which we labor in our foreign trade that we have not yet developed education along these lines as thoroughly as our foreign competitors.

The intensity of competition in the electrical line in Latin America, as outlined above, should not, however, discourage American manufacturers. We have an extensive trade in these countries which is rapidly growing. Our products are recognized as of the highest quality and generally speaking have a better rating with our Latin American neighbors than those of our foreign competitors. Owing to the fact that the Germans have, and do, put on the market goods of an inferior quality, sold on a purely cost basis, the better class of goods suffer in consequence. British products, on the other hand, while of high quality, are considered by many Latins to be unnecessarily substantial and high priced. Because of these criticisms American manufacturers gain an advantage. Our goods are generally considered strong enough for all practical purposes, and sufficiently low in price to compete with the British, while retaining a uniform and dependable quality, which makes them superior to the German goods.

Strangers Must Conform to Latin Business Habits

The hustle and rush incident to business in the United States is largely eliminated in Latin America. Sales are made quietly, and the new salesman, unfamiliar with conditions, will at first feel that he is making slow progress, a good deal of wining and dining at restaurants and a general ignoring of business subjects.

In the warm countries offices close during the heat of the day, and the afternoon *siesta* is an essential part of life. Buying, as a general thing in these countries, is done in the late afternoons, or even at night. Stores and offices remain open late, seven, eight, nine o'clock in some cases.

Courtesy and deference almost become fetishes, and business is seldom discussed on the first visit. Often a second or third visit may be necessary before an appointment can be made to inspect samples, or talk business, and when arranged it may possibly be for 9 p.m., or even on a Sunday.

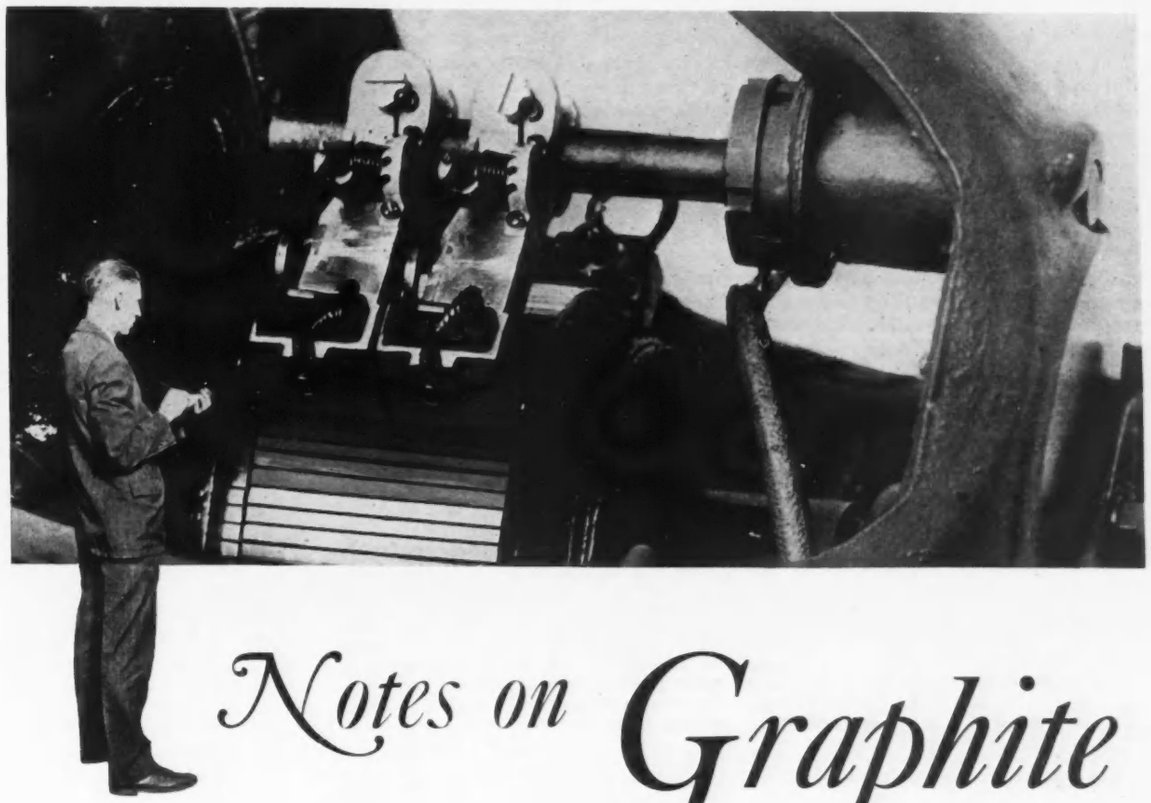
Mails leave Latin countries as steamship sailings occur, and the salesman who approaches a prospect on one of these mail days will "be out of luck." In the course of time the new salesman will become familiar with these peculiarities of Latin trade, and will conform to custom. Any effort to go against the stream is fatal.

It is for this reason that the salesman who plans an itinerary which gives a few days to a country, with the idea that he can visit its merchants and speed on to other fields, will find his efforts entirely abortive.

In closing, I wish to give the prospective exporters some little idea of CREDIT TERMS:

These run, in most Latin American countries from 30 to 120 days, and many European firms extend these to even six months or a year. Such long terms, however, are not generally considered sound economically, as they involve careful credit investigations which may be prolonged so that trade is sometimes hampered as a result.

The fact that American trade is constantly increasing with credits of 30 or at most 60 days, shows that the long term accommodations are not generally necessary, and with proper products and sound prices, goods can be sold on the shorter terms without difficulty.



Notes on Graphite

One of a series of articles on raw materials commonly used in the electrical industry

By William Crawford Hirsch

ELECTRICAL developments have been responsible for the ups as well as the downs in graphite consumption. Fifteen years ago three-quarters of the world production of this mineral went into the making of crucibles for the melting of metals, especially of high-grade steel. Along came the electric furnace and the demand for crucible steel dwindled from more than 125,000 tons in 1917 to between 5000 and 10,000 tons in the last few years while the electric furnace product gradually rose to an annual output of more than 800,000 tons. For a time the demand for graphite suffered sharply, dropping from nearly 60,000 short tons in 1917 to approximately 12,500 tons in 1921. War demand entered into the 1917 consumption, but the major portion of the decline during the years immediately following must be charged to the displacing of crucible by electric steel. Recovery in the last few years is to be traced directly to the heavily increased consumption of graphite in the manufacture of dry cell batteries. There has also been an increase in the consumption of graphite in commutator brushes. While these increases so far by no means offset the loss entailed by the sharply curtailed takings of crucible makers, these electrical uses are not only encouraging, but the one bright spot in the graphite situation from the producer's and importer's point of view. The last available census of graphite consumption, that for the year 1924, accords to foundry facing more than one-half of the tonnage absorption. It is quite possible that when the next census of consumption is available the picture will be completely altered. This, in fact, is sensed not only in the graphite market, but by Government investigators. Paul M. Tyler, Bureau of Mines, United States Department of Commerce, in a series of information circulars that constitute the latest available information on the mineral, lays much stress on the growth in consumption by dry cell manufacturers and points out that further increases in the use of graphite for foundry facings tend to be checked by a larger use of sand blasting for cleaning castings as well as by the competition of other facing materials and the larger use of die-casting.

GRAPHITE, known also as plumbago or black lead, is a variety of carbon. The Graphite Mines Company's deposit at Cranston, near Providence, R. I., is being worked for amorphous graphite as well as anthracite coal. The principal classifications of graphite are crystalline or flake and amorphous. The latter designation is more commercial than mineralogically accurate because "amorphous" graphite is not uncrystallized, though the structure is not distinguishable by the naked eye. Besides these two forms of natural graphite, artificial graphite, made from anthracite with a small admixture of iron ore, in the electric furnace at temperatures ranging as high as 7500 deg. Fahr., finds wide use in electrical applications.

With the spectacular decline in the consumption of graphite in the manufacture of crucibles, causing a cut of one-half or of 10,000 tons a year in the demand for crystalline graphite as compared with the period before the full sway of the electric furnace made itself felt, the entire structure of the graphite industry is in the throes of readjustment. The demand for amorphous and artificial graphite has increased to the same extent as that for the crystalline variety has fallen off, but while the aggregate consumption of graphite has undergone little change, this

shifting of grades has vitally affected sources of supply. At one time, 50,000 persons on the island of Ceylon earned their living in the mining, hand-picking, dressing and packing of graphite, and half the product of these Singhalese came to the United States where Ceylon graphite has always enjoyed a high reputation for quality. Lately Madagascar, where the French government has introduced a standard which when adhered to is officially certified, has been giving Ceylon a hard battle, the lower-priced Madagascar flake having in many uses come in for substitution for Ceylon lump and chip. By way of Japan, we get some graphite from Chosen (Korea). The largest graphite mine on the North American continent and perhaps the largest in the world is the Black Donald mine in the township of Brougham in Renfrew County, Ontario, Canada, where there is a unique body of high-grade, small flake ore, ranging from 60 to 80 per cent in graphitic carbon content. Canada possesses widely distributed graphite deposits, and most of their production is shipped to the United States. The largest producer on the North American continent is an American company which owns extensive deposits in Sonora, Mexico, about 350 miles from the border. The product is an exceptionally pure amorphous grade, which is shipped to the company's mill in Michigan where it is prepared for industrial utilization.

Under the stimulus of high prices, domestic producers of graphite managed to contribute adequately to the Nation's War requirements when the dislocation of shipping and restrictions imposed for foreign governments made the obtaining of supplies from Ceylon and Madagascar a difficult undertaking. While domestic deposits are numerous and extensive, nearly half of the States containing graphite deposits, most of them are low-grade in character, and therefore more important as a strategic reserve than as a potential main source of supply in normal times. Production of crystalline graphite in 1929 was 5,425,900 lb. Only one amorphous graphite mine was in operation. A good deal of material was sold, however, from stock that had been mined in previous years and held, aggregate sales of both kinds of natural graphite amounting to 6500 tons, valued at approximately $300,000. Importations in the same period totaled 24,000 short tons, valued at $1,000,000. Production of artificial graphite has fluctuated considerably. The industry has produced as high as 25,000,000 lb. a year, and undoubtedly has had more influence on importations than has the domestic output of natural graphite. Relatively high labor costs and freight rates to consuming markets are a handicap that operates against the building up of a peacetime natural graphite industry and is not likely to be overcome by the increase in the duty provided in the new Tariff Act: 30 per cent ad valorem on lump, chip or dust (crystalline) and 1.65c. per pound on flake (amorphous), as compared with 20 per cent ad valorem and 1½c. per pound, respectively, under the old Tariff Act. Consumption of artificial graphite of domestic manufacture, however, is stimulated by the increased duties on the natural product.

BATTERY graphite must be free from iron, uniform in quality, wholly inert, and possessed of good electrical conductivity. It is because graphite is a better conductor than granulated carbon that it has displaced the latter to a considerable extent. A good grade of domestic crystalline or artificial graphite is used in dry cells. The graphite is mixed with the manganese dioxide depolarizer. In some quarters, it is estimated that fully three-quarters of the domestic output of crystalline flake and considerably more than that of artificial graphite find their way into dry cells. Some amorphous is also used for this purpose. A leading dry cell manufacturer acquired, two years ago, control of the Niagara Falls (N. Y.) plant that has pioneered in the manufacture of artificial graphite. There also a large number of graphitized electrodes, used chiefly in connection with electrolytic processes are produced. These are not made from natural graphite. The artificial process permits of closest control of purity, conductivity, and resistance to oxidation. These electrodes, ranging in size from 1/16 in. to 12 in., can be easily machined.

Graphite is used in commutator brushes because of its conductivity as well as because it is self-lubricating. The substances used with the graphite are powdered petroleum coke, powdered copper or kindred pulverized alloys, such as bronze or brass. These finely powdered materials, together with coal tar to serve as a binder, and benzol are thoroughly mixed mechanically, the hot material from the steam-jacketed mixer being then placed in steel forms and molded in hydraulic presses under a pressure of 10 to 20 tons per square inch into 3x5 in. slabs of varying thickness. These are then packed into saggers with powdered coke and fired in kilns at 1300 deg. C. for about eight hours, remaining in the kilns for more than three days altogether. Carborundum saws cut the baked slabs to the required size. After they have been smoothed and provided with the necessary holes, the "pig tail" is attached. Some brushes have electroplated upper ends and pigtail socket, while others are tinned to insure perfect contact between pigtail and brush. The former is held secure either by solder or with rivets. One type of graphite brush is made in layers so arranged that the resistance across the brush is seven to eight times that in the opposite direction. Another type has a phenol-formaldehyde compound binder. American manufacturers use high-grade Mexican and domestic amorphous and artificial graphite in the making of brushes, while finely-ground Ceylon is said to be used in the leading foreign makes. Pure graphite brushes serve principally for high voltage use. They have high carrying capacity, medium contact drop and low coefficient of friction, making them especially suited for high commutator speeds. Graphite brushes are either non-abrasive or only slightly abrasive. They make for quietness of operation. Carbon-graphite brushes, with a predominating carbon content, usually contain sufficient graphite for lubrication. Their use is chiefly in industrial motors and small apparatus.

GRAPHITE is used in the electrical industry largely in dry cells, commutator brushes, bearings, foundry facings and paints. It is used in commutators to prevent sparking and to provide lubrication, and in bearings to provide self lubrication. The substances used with graphite in the making of commutator brushes are powdered petroleum coke, powdered copper or kindred pulverized alloys, such as bronze or brass. These finely powdered materials are mixed mechanically and moulded in hydraulic presses.

IN electrotyping graphite is used in finely powdered form, either amorphous or artificial, for dusting the forms previous to stripping and for giving to the mold a conducting surface when it is immersed in the plating bath.

Discs, bushings, washers, and similar parts are cut out of graphitized carbon rods. Most of the graphitized carbon electrodes are made by the extrusion method.

A large part of the consumption of graphite in the electrical industry is in the form of foundry facings and paints. It is also used in commutator compounds to stop sparking.

Modern flotation systems have been installed in some of the graphite concentrating and refining mills of the United States. Graphitic carbon content is the measure of purity, commercial grades of natural graphite ranging all the way from 35 to 95 per cent. The French government standard for No. 1 Madagascar flake is 85 per cent graphitic carbon, so as to mostly pass 20-mesh and remain on 60-mesh. Lubricating graphite is bought largely on the basis of its fineness and freedom from grit. There are innumerable grades, standard classification lacking. Packages range in size from 150-lb. sacks to 700-lb. casks.

Facts, Figures and Trends

Over Four Million Radio Sets Sold in 1929

It has been estimated that on January 1, 1930, there were 11,500,000 radio sets in use in the United States, a gain of 2,000,000 sets for the year 1929 alone. Seven years earlier, the total number of radio sets in use in this country was believed to be 1,500,000, of which only a comparatively small part were factory-made and distributed as radio sets are today. The majority of sets at that time were home made.

The sales of new radio sets during 1929 totalled 4,118,000, according to a report in the *Outline of Business*. Radio equipment sold in 1929 reached a value of $805,328,000, as compared to $690,550,000 in 1928.

The estimate of 11,500,000 sets now in use indicates that approximately 41 per cent of the 28,000,000 American homes are equipped with radios. This figure of 28,000,000 is considered the saturation point for the radio industry in this country, but once it is reached, there seems to be an indicated replacement demand of over 5,000,000 sets a year, based on the number of sets in use at the beginning of 1929 and the number that was scrapped during the course of the year.

Tariff Changes in French Indo-China

The general customs tariff on imports into French Indo-China has been increased for nearly all goods imported from America. For example, the tariff on flashlight batteries has been increased from 3.25 francs to 13 francs per kilogram and on batteries from 8 francs to 32 francs per kilogram.

Manufactured Weather

The first railroad car to manufacture its own weather was successfully demonstrated recently by the Baltimore & Ohio, when a diner was run in a regular train between Baltimore and Cumberland, Md., according to the *Wall Street Journal*. The car is completely equipped to cool and cleanse the air and provide ideal conditions of comfort for the traveling public regardless of the season or outdoor weather.

It was found that on the hottest days, not only a temperature of 10 to 15 degrees below that outside can be obtained, but even more important, that excessive humidity during muggy summer weather can be removed. As proof of this, with full winter heating capacity of the car turned on, intensified by the heat from the kitchen and already warm outdoor weather, the new system was set in operation to counteract these effects and the temperature was reduced 23 degrees in 20 minutes.

Railroad officials predict that the air-purifying and cooling system applied to dining cars and coaches, as well as to sleepers will "revolutionize" railroad travel.

Lift Ban on American Radios

It is said that the Gold Coast ban on radio sets and equipment manufactured in territory other than British has been lifted. In order that American manufacturers of such equipment might be in position to take advantage of this situation it would be expedient for them to forward catalogs, prices and other pertinent information to American Trade Commissioner Leonard J. Schwartz, post office box 476, Accra, Gold Coast Colony, West Africa.

Indications are that electric rather than battery sets would be preferred and short wave receivers seem to give the best reception. Seven of the larger Gold Coast towns are equipped with 220 volt, 50 cycle current, about equally divided between alternating and direct current.

Slump in Exports

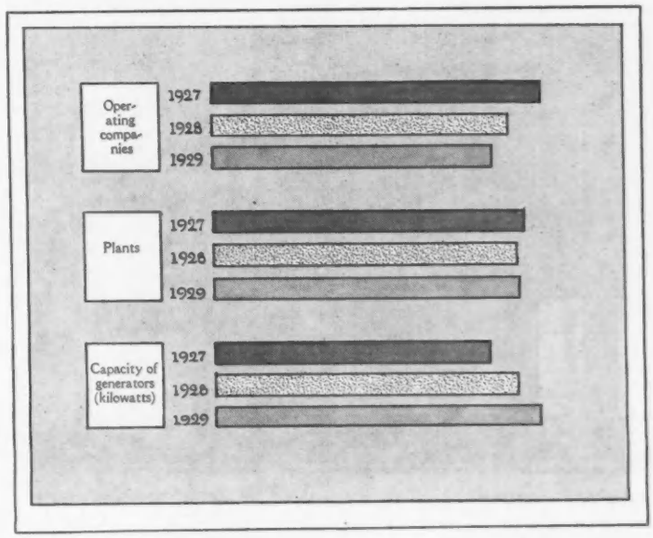
Exports of merchandise from the United States in March were valued at $374,000,000, compared with $351,000,000 in February and $489,700,000 a year ago. Compared with March, 1929, there is a decrease of $115,000,000. For the first three months of this year exports amounted to $1,133,794,000 against $1,419,000,000 in 1929, a decline of about $285,000,000 for the three months. Of this decline the greatest part occurred in March.

Architects Using More Light

The increasing use of light, not only for utilitarian illumination but for decorative purposes, is bringing the architectural profession and the electrical industry closer and closer together. Light is being made an integral part of our modern commercial structures, the architects using it as a means of supplementing and enhancing other elements in design and decoration.

Fewer Companies and More Plants in Utility Field

Statistics on the number of operating companies, number of plants, and capacity of generators in the United States from 1927 to 1929 inclusive shows a trend in the public utility field toward consolidation. Referring to the accompanying chart, it is seen that the electrical manufacturer who sells equipment to public utilities has fewer people to sell to than he had in 1927, but has a possibility of selling more equipment. A trend toward consolidation is a trend toward fewer and larger orders for electrical equipment. It is interesting to note that the number of public utility operating companies decreased from 1927 to 1929 at about the same rate as the capacity of generators increased as shown in the accompanying chart.



Utility Consolidation Trends

Italian Imports of Electrical Goods

During the year 1928 the value of all the manufactures for electrical purposes imported into Italy was 289,657,200 liras, but for 1929 the corresponding figure was 353,541,600 liras. The outstanding increase was in radio apparatus, which rose from a valuation of 30,201,000 liras to 75,573,-800. Other telephone and telegraph apparatus was imported to the value of 67,938,000, as compared with only 53,044,-600 liras in 1928.

Night Sports Demand Lighting Equipment

The night lighting of sports, such as tennis, football, race-track and outdoor golf practice schools has been a pronounced success. Night attendance figures often are several times those previously obtained at daytime events.

Ford Advises

"As to the question of industrial problems," said Henry Ford in an interview in the London *Spectator*, "the main trouble everywhere, including America, is that leaders in industry do not properly interpret their difficulties as warnings to change their methods.

"They want to remain as they are. They suppose that the present condition is just a passing flurry which will soon settle in restoration of the placid old times. They do not see that they have received notice to quit, that the new time is upon us. They are old-fashioned and want to remain so. It is a common human failing, but it is becoming impossible to indulge it any further. Life itself is ordering us out."

Domestic Electrical Service on the Increase

Continuation of the high rate of increase in the use of domestic electrical service is particularly impressive, inasmuch as it implies the maintenance of the purchasing power of the consuming public and shows, thus far, few signs of their retrenchment insofar as the use of electricity is concerned.

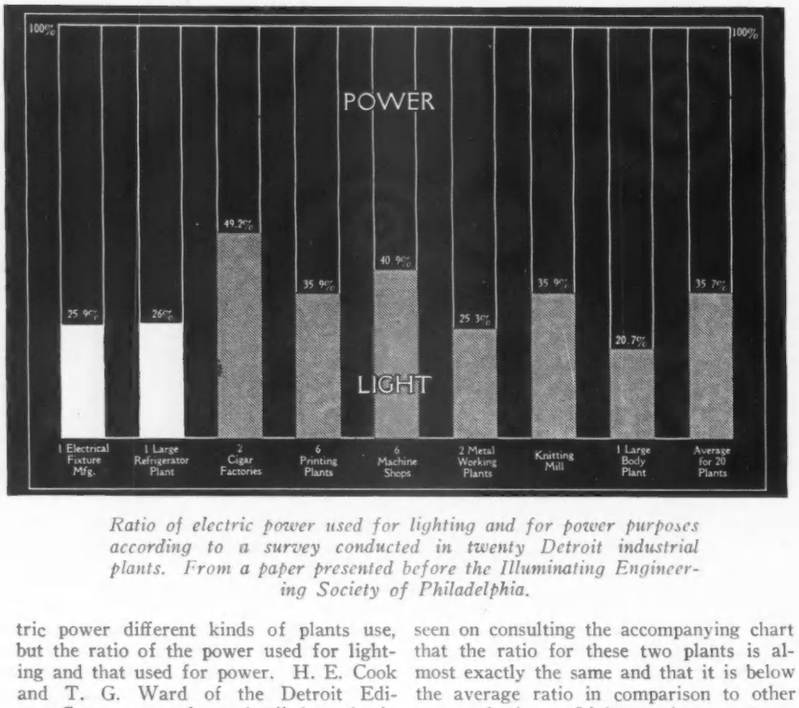
Gain of Domestic Electrical Service Over Same Month of Previous Year

	In Sales of Domestic Service	In Sales of Commercial Service	In Total Kw-hrs. Sold
September, '29	17.5%	12.8%	12.2%
October, '29	17.4%	8.7%	9.2%
November, '29	15.4%	6.7%	7.7%
December, '29	16.0%	7.6%	8.5%
January, '30	15.2%	5.2%	6.4%
February, '30	14.1%	2.1%	3.5%

Compared with last year, the use of energy in the average home has grown by 49 kilowatt-hours per year, an increase of more than 10 per cent.

Ratio of Electric Power Used for Light and Power Purposes in Twenty Detroit Plants

Electrical manufacturers selling equipment to industrial plants should find it valuable to know not only how much electric power different kinds of plants use, but the ratio of the power used for lighting and that used for power. H. E. Cook and T. G. Ward of the Detroit Edison Company, made a detailed study in twenty Detroit plants to discover these ratios for different types of plants. Among the plants chosen were two electrical manufacturing plants. It will be seen on consulting the accompanying chart that the ratio for these two plants is almost exactly the same and that it is below the average ratio in comparison to other types of plants. Light portions represent lighting load and dark power load.



Ratio of electric power used for lighting and for power purposes according to a survey conducted in twenty Detroit industrial plants. From a paper presented before the Illuminating Engineering Society of Philadelphia.

Where Copper Comes From

The following table compares in short tons copper production of the world, summarizing direct reports, except as to about 2 per cent estimated under the head of "elsewhere." This summary is on the basis of fine copper content of blister, and in the main production is shown as reported by smelters without any attempt to segregate according to countries of origin.

	Nov.	Dec.	Jan.	Feb.	Mar.
United States.	94,861	89,789	84,451	74,094	78,514
Mexico	4,872	5,227	5,067	4,657	4,876
Canada	7,291	8,009	8,053	6,750	8,390
Chile & Peru.	27,007	27,226	23,967	21,120	21,367
Japan	8,004	7,710	7,272	6,362	6,662
Australia ...	1,409	1,720	124	1,546	1,796
Europe * ...	13,100	12,400	12,600	12,200	12,700
Africa	11,041	10,638	10,297	‡10,000	‡10,100
Elsewhere† ..	3,000	3,000	2,500	2,500	2,500
World's tot..	170,585	165,728	154,331	139,229	146,905

* Incomplete; partly estimated. †Estimated. ‡Partly estimated.

Unemployment Decline Shown

The ratio of applicants to jobs at the ten free employment offices conducted by the State Department of Labor (four of them in Greater New York), was progressively less during each of the first three months of 1930. However, the number of applicants per hundred jobs during January, February and March, this year, was almost twice as great each month as for the corresponding months of 1929.

The comparative figures for the two years are as follows: In January, 1930, 287 applicants per 100 jobs, against 168 in 1929 month; February, 275, against 168, and March, 236, against 151.

50 Cycle Clocks in Germany

There are in Germany 115 cities having a population of over 10,000 whose central stations furnish regulated current for the use of electrical clocks. Where such service is given the frequency is standardized at 50 cycles. The ordinary alternating current voltages in Germany are 110 and 220.

Changes in Latvian Import Duty on Machines with Electric Motors

The Tariff Commission of the Latvian Customs Department decided on March 5, 1930, that the duty on all machines combined with electric motors imported into Latvia should be the rate fixed for the respective machines without the electric motor. The new regulation became effective March 14, 1930.

The above results in a substantial reduction in the import duty for such machines or apparatus because formerly, in addition to the duty on the machine or apparatus, a duty of 0.06 Lats per kilogram net was levied on the motor.

Power House Efficiency Reduces Coal Needs

The improvement in the efficiency of electric generating stations which has been progressing at a rapid rate during the last seven years has carried the figure for the number of pounds of coal necessary to produce one kilowatt-hour of electrical energy from 2.5 in 1922 to 1.7 in 1929.

Based on the rate of output of energy in 1929, this saving in effciency has saved the electrical utilities of the country 23,000,000 tons of coal in the year 1929, according to a report of the National Electric Light Association.

Canadian Bill Aiding Farmers to Purchase Electrical Equipment

A bill has passed in the 18th Ontario Legislature, entitled "An Act to Provide for Granting Aid toward the Installation of Electrical Works in Rural Power Districts." This bill provides for a fund not exceeding $2,000,000 for the purpose of providing advances toward the installation of electrical services in rural power districts including wiring from the transmission or distribution lines of the Hydroelectric Power Commission of Ontario into and throughout dwellings, barns, outhouses and any other works which may from time to time be specified in regulations made under the authority of this Act, and also such transformers, motors and other appliances as may be necessary or expedient for any industrial, agricultural or domestic purposes, or which may be specified in the regulations.

359,000,000 Lamps in 1929

During 1929 a total of 344 million large tungsten filament lamps were sold in the United States. This is the greatest number of lamps ever sold in any one year and represents an increase of 8.7 per cent over the previous year. More than 15 million carbon lamps were sold during the year, as compared with 12 million sold in 1928, of which 88 per cent were imported.

These figures do not include miniature lamps, such as those used in flashlights, automobiles and for decorative purposes such as on Christmas trees. Of these nearly 260 million tungsten filament and 19 million carbon filament lamps were sold, the largest number being for use on automobiles, which totaled 138½ million.

Indian Import Duty Modified for Radio Receiving Sets

The following changes with regard to the British Indian Assessment of import duty on wireless apparatus were made, effective April 5, 1930:

Apparatus designed solely for the reception of broadcast wireless and such component parts of apparatus for wireless telegraphy or telephony as can be used as parts of apparatus for the reception of broadcast wireless become dutiable at 12½ per cent ad valorem; other apparatus for wireless telegraphy or telephony and other component parts thereof will retain the special duty of 2½ per cent ad valorem.

Homes—Great Market for Lighting Equipment

According to a number of surveys, the average home is grossly underlighted. One surveyor, who covered one city of 250,000 people and 4 cities of about 30,000 people, reported an estimated average of only about 3 lamps per home burning at the time of his calls.

Pays to Electrify

Since the Illinois Central Railroad began electrifying its suburban lines around Chicago in 1926, the rate of increase in its passenger business has more than quadrupled. The average increase for the last two years of steam operation was 818,611 passengers a year. The average increase for the last two years of electric operation was 4,013,111 passengers a year.

Electrified Farms Increased 21.5 Per Cent in 1929

During the year 1929 the total number of electrified farms in the United States increased from 460,000 to 558,000, or by 21.5 per cent. This is the largest annual increase so far recorded.

At the end of 1923 there were only 166,140 farms receiving electric service, according to a survey which was made by the Rural Electric Service Committee of the National Electric Light Association. Since that time the total number has been increasing double every 3½ years.

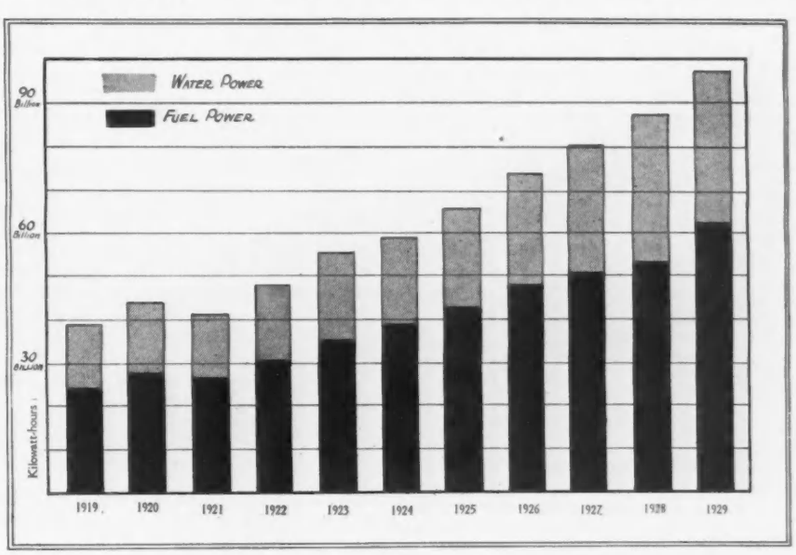
Statistics of the Light and Power Industry

Basic information on the electric light and power industry as of Dec. 31, 1929, and issued by the Statistical Research Department of the National Electric Light Association, is as shown in the following tabulation:

1. Value of plant and equipment (estimated)	$11,031,000,000
2. Total generating capacity in kw	29,495,000
Steam	21,562,000
Waterpower	7,604,000
Internal combustion	329,000
3. Total number of customers served	24,249,000
Farm customers (as reported by 208 companies only)	256,000
Domestic customers	19,999,000
Commercial customers	
Large light and power	567,000
Small light and power	3,648,000
Others	35,000
4. Population in electrically lighted homes	84,000,000
5. Percentage of homes which are served with electricity	68%
6. Miles of transmission lines (11,000 volts and above) (circuit miles)	162,000

Is Water Power the Coming Thing?

There has been a great deal of misunderstanding about the relative trends in the market for water power equipment and steam power equipment for utility plants, according to figures published by the Department of the Interior. It is seen by referring to the accompanying chart that, although the power generated by water and that generated by steam are both growing, steam power is much the more important of the two. From 1919 to 1929 steam power increased nearly twice as much as water power. Although there are many places in the country where it is highly economical to obtain power from falling water, the general trend throughout the nation is toward an increased use of steam power.



RELATIVE growth of water power and steam power in the United States over the ten-year period between 1919 and 1929. Both have increased, but steam power has increased nearly twice as fast as water power

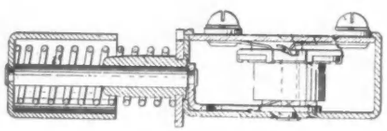
Electrical Patent News

Here are collected in condensed form a few of the outstanding recent patents of electrical devices

By Ray Belmont Whitman
Patent Attorney

Light Dimming Switch

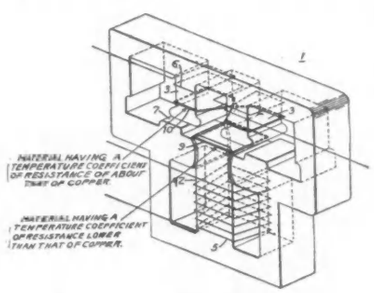
1,763,028. This patent issued to Robert K. Winning of Wauwatosa, Wis., and assigned to Clum Manufacturing Company of Milwaukee covers a switch with six contacts and a pivotally movable contact means arranged for coaction therewith, and mechanism for moving the contact means including a reciprocable plate, rack teeth in one of the arms and a contact ac-



tuator including a disk pivoted between the arms in the plane of the plate and provided with peripheral meshing with the marginal rack teeth.

Electrical Measuring Instrument

1,764,339. This patent issued to Carl Oman, of Swissvale, Pa., and assigned to Westinghouse Electric & Manufacturing Company, concerns a voltage and current


MATERIAL HAVING A TEMPERATURE COEFFICIENT OF RESISTANCE OF ABOUT THAT OF COPPER.
MATERIAL HAVING A TEMPERATURE COEFFICIENT OF RESISTANCE LOWER THAN THAT OF COPPER.

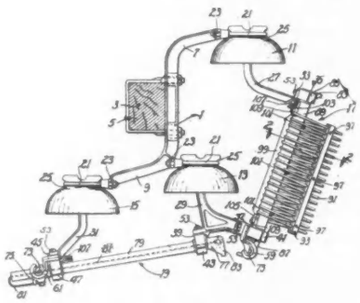
means for creating a plurality of cooperating fluxes for an electro-responsive device with means affected by the temperature for controlling the operation of the instrument.

Disconnecting Choke-Coil Switch

1,760,895. Issued to Lester Pierce Boll of Maplewood and Arnold Clement Hansen, Jr., of St. Louis, Mo., and assigned to W. N. Mathews Corp. of St. Louis. This covers a combination of a choke coil switch and a fuse switch, a frame, insulators, contacting clips on the brackets affixed to the insulators to resiliently hold

Copies of any of the patents cited may be obtained by sending 15 cents to the Patent Editor, in care of Electrical Manufacturing, for each copy wanted.

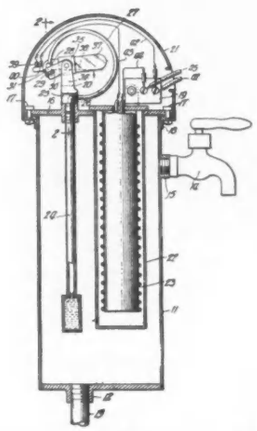
at least two circuit closing members, one the fuse and the other the choke-coil switch



together with other means for preventing longitudinal movement of the part when operatively positioned.

Heater

1,764,139. Max Alex of Bloomington, Ill., obtained this patent and assigned it to the Summit Corporation of Davenport,



Iowa. It has a casing with an inlet and an outlet and heating means to heat the fluid in the casing and also contact means for controlling the flow of current through the heating means with an expansible element making the operation automatic.

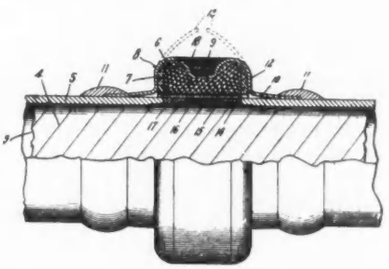
Insulator

1,764,434. Issued to Paul B. Cochran, Wilkinsburg, Pa., and assigned to Westinghouse Electric & Manufacturing Company. This insulator has a member of a material subject to progressive charring

by corona from a terminal portion toward another terminal portion and means for covering a portion of the member to prevent such charring.

An Insulating Joint for Cable Sheaths

1,760,546. This patent by Eugene D. Ely, Pittsfield, Mass., and assigned to the General Electric Company covers an in-



sulating joint for cable sheaths. It has a pair of tubular members with fluid-tight end and an insulating cylindrical body with external ribs gripped by the enlarged end of the members.

A Method of Welding Rails

1,762,086. Issued to Curt Stedefeld, Heidelberg, Germany. This is a divisional

application from an original application filed in 1928 and covers a method of welding rails involving stretching a section

YOUR Reasoning Starts From One of These

WE ARE IN NEW TIMES NOW. A lot of thinking in dead-earnest is going on everywhere. And by *all* the parties concerned. Workers, executives, employers, customers. There is no one who is *not* concerned.

Let us take a look at the different parts of the subject, and note how they connect and depend on one another. What they are thinking so hard about is:

1. Pay; earnings, payrolls.

2. Jobs; safety, steadiness, permanence; possibilities of layoffs; or of calling back men now laid off.

3. Volume of work; chances of getting it back, keeping it up, or increasing it.

4. Costs. Margins. Profit.

5. Orders. What they depend on. How to make sure of getting them, under conditions existing now; and under conditions that are coming, before the turn-up, and after it.

6. Customers. Purchasing Power, and Willingness. Present attitude as compared with 1929. Probable attitude in 1931-1932.

7. Adjustments — (of product, costs, price, performance, or other satisfactions)—to meet Customers' present attitude; and probable attitude later.

8. Competition; as it is now; and as it may be, before the turn-up, and afterward. What Competitors are doing, and getting ready to do; or might do; (about 7, 6, 5, 4, 3, 2, 1, above).

9. The General upward turn of business as a whole. What can be done to ensure it, and to bring it about, soon. What conditions may precede it. When it will come. And what the conditions—(as to 8, 7, 6, etc.)—will be, after the turn-up and while the new prosperity is growing.

10. Own Company's Turn-up. Can it come earlier than the *general* turn-up? Can the Company start "swimming up stream" before the others do? Men of each live concern are figuring this, irrespective of the general trend. What they can do about 5, 2, 1, 4, 8, etc. How they can check their Own Company's dip, flatten its curve, turn it upward *soon;* and make sure that it shall have the strongest position during the prosperity that is coming.

* * *

And through it all, there is a new awakening to the fact that now, too often the REAL drag on profits and on success in competition, is the using of WRONG MATERIAL.

In the New Times, the New Thoroughness,—*reasoning* starts from the *foundation,*—recognition of the supreme importance of—

Thinking in the RIGHT MATERIAL.

NVF

Write today for FACT-SHEETS OF INDUSTRY No. 1,—giving practical knowledge which hitherto has not been readily accessible —Mailed FREE to any worker or executive. Limited Edition—Write NOW, stating work you do, your company's product or business, and whether request is for self. Address Librarian (Dept C-5), National Vulcanized Fibre Company, Wilmington, Delaware.

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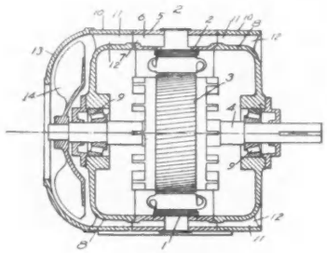
Makers of Special Phenolites; "righter" Bakelites; "Peerless" insulation; many kinds of Vulcanized Fibre: Material Handling equipment, etc. . . . Serving America's industries from smallest to greatest

against the abutting end of adjacent rails and then welding together.

Electric Machine

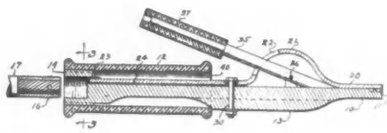
1,762,455. This patent was issued to Anton Preedit, Erie, Pa., who assigned it to Armor Electric Mfg. Co., Erie, Pa. It



has an air circulating case over the housing for the stator and forming air passages through the housing and other means for keeping the motor cool.

Metallic Electrode Holder

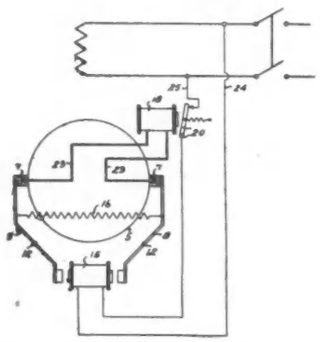
1,761,728. Issued to Homer H. Heckman of Detroit. This electrode holder is used for electric welding. This patent covers a device for this purpose having a



tubular handle of insulating material, a pair of metallic jaw members extending into the handle, one of the members being composed of metal of high conductivity and sufficiently large cross section to conduct without material heating by the welding current.

Brush Lifter for Electric Motors

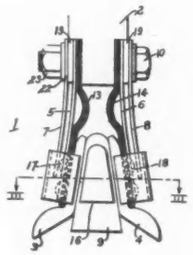
1,764,709. Issued to Gordon R. Anderson, Indianapolis, Ind., and assigned to Fairbanks, Morse & Co., Chicago. This



device has an armature and brush-lifting mechanism and electromagnetic means connected across the brushes and arranged for controlling mechanism by armature current through the brushes.

Circuit Interrupter

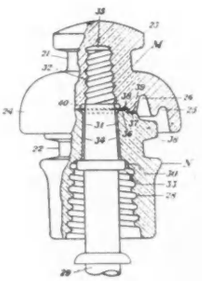
1,764,369. Roswell C. VanSickle of Wilkinsburg, Pa., obtained this patent and assigned it to the Westinghouse Electric



& Manufacturing Company. It has a parallel-path contact member and an iron loop around the member forming a magnetic path about the point of contact.

Insulator

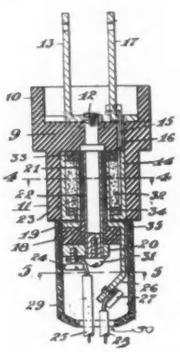
1,760,983. Issued to Chester S. Gordon of Boonton and James T. Lowe of Newark, N. J., and assigned to American Telephone & Telegraph Co. This patent



covers an insulator for transmission conductors in which provision is made for preventing water from getting to the operating part and with ease and economy in manufacture in mind.

Swivel Electrical Connector

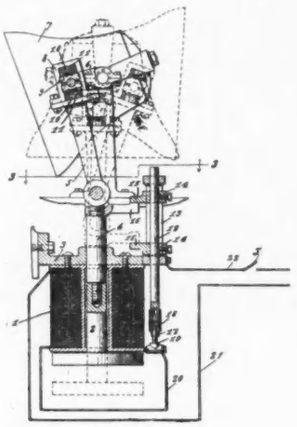
1,762,422. Harold Rohrdanz, Inglewood, Cal., obtained this patent. This connector has a pair of spaced telescoping relatively revoluble electrically conductive members. and a fragmentary electrically conductive



material between them to direct an electric current from one member to the other through the fragmentary material.

Electromagnetic Locomotive Bell Ringer

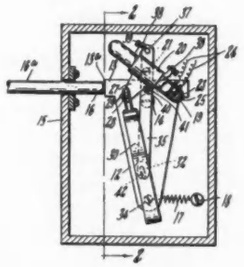
1,762,500. Issued to George M. Bessant, San Bernardino, Cal. This inven-



tion covers a reciprocating motor with suitable mechanism for ringing the bell on a locomotive.

Expansion and Contraction Switch

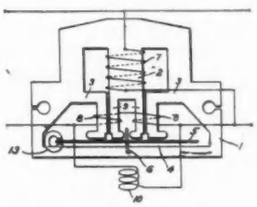
1,761,456. Henry Gehard Schlichter of Fitchburg, Mass., obtained this patent which covers essential element including a thermostatic abutment movable in a pre-



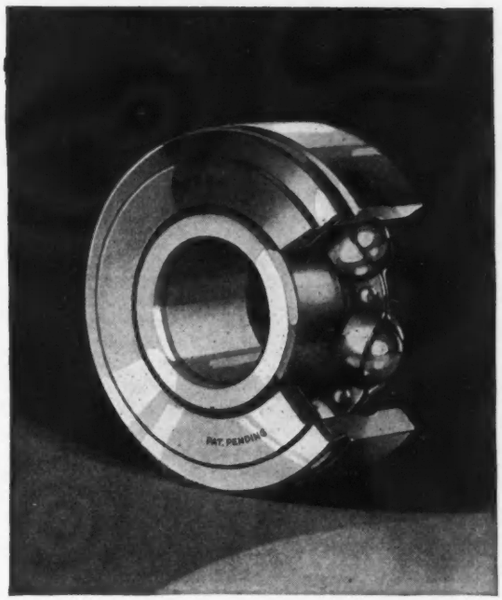
determined path by expansion and contraction and a circuit controller connected relative to the abutment and other operative element associated therewith.

Integrating Meter

1,763,175. Hans Nutzelberger, Nuremberg, Germany, who obtained this patent, assigned it to the Westinghouse Electric & Manufacturing Company. This motor



meter has a torque-producing magnet system with current and pressure winding, and an auxiliary coil of manganin wire in shunt-circuit relation to the current winding for compensating the meter for errors caused by temperature variations.

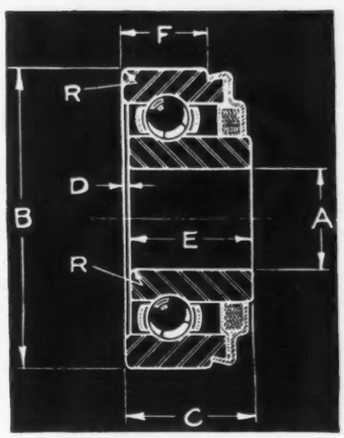


Another "PRECISION" Bearing

"GREASEAL"

BALL BEARING

A Notably Better Bearing With Distinctive Economic Advantages



Write for the "Greaseal" Data Sheets, showing details of application

A self-contained, self-sealed, grease-packed, dirt-proof bearing with a larger grease capacity, ready for years of service without renewal of lubricant.

Needs only the most simple and inexpensive mounting, with the very minimum of machining and assembling cost.

AN ALL-STEEL BEARING, WITH A SOLID, ONE-PIECE OUTER RING.

Bearing Number	Bore "A" M. M.	Bore "A" Inches	O. Dia. "B" M. M.	O. Dia. "B" Inches	Width "C" Inches	Offset "D" Inches	Length "E" Inches	Width "F" Inches	RAD. "R" M. M.	RAD. "R" Inches
GS-96	6	.2362	19	.7480	.3543	.016	.3383	.2362	1	.039
GS-97	7	.2756	22	.8661	.4060	.016	.3900	.2756	1	.039
GS-98	8	.3150	22	.8661	.4060	.016	.3900	.2756	1	.039
GS-98246	6	.2362	24	.9449	.4060	.016	.3900	.2756	1	.039
GS-98247	7	.2756	24	.9449	.4060	.016	.3900	.2756	1	.039
GS-9824	8	.3150	24	.9449	.4060	.016	.3900	.2756	1	.039
GS-99	9	.3543	26	1.0236	.4527	.016	.4367	.3150	1	.039
GS-200	10	.3937	30	1.1811	.5118	.016	.4958	.3543	1	.039
GS-201	12	.4724	32	1.2598	.5512	.016	.5352	.3937	1	.039
GS-202	15	.5905	35	1.3780	.5905	.016	.5745	.4330	1	.039
GS-203	17	.6693	40	1.5748	.6693	.016	.6533	.4724	1	.039
GS-204	20	.7874	47	1.8504	.7480	.016	.7320	.5512	1	.039
GS-205	25	.9843	52	2.0472	.7874	.016	.7714	.5906	1	.039

NORMA-HOFFMANN BEARINGS CORPORATION STAMFORD, CONN., U.S.A.

NB-1067

What's NEMA Doing?

A department covering activities of the divisions, committees and sections of the National Electrical Manufacturers Association

Berresford, Nema Official, Receives Award

A. W. Berresford, managing director of Nema, was presented on July 9 with the Phoebe Hobson Fowler Professional Award "in recognition of his excellent work as president of the American Engineering Council." The ceremony took place in Cleveland at the annual convention of the American Society of Civil Engineers.

The second medal went to J. Vipond Davies in recognition of his services as chairman of a committee of the society which developed the report on charges for professional services. Mr. Davies is a consulting engineer of New York City.

Mr. Berresford was born in Brooklyn, July 9, 1872. He is a graduate of Brooklyn Polytechnic Institute and of Cornell University. He is a past president of the American Institute of Electrical Engineers of the Associated Manufacturers of Electrical Supplies and of the Electrical Manufacturers' Club. He is a former vice-president and general manager of the Cutler-Hammer Manufacturing Company of Milwaukee, with which he was connected from 1900 to 1923. He was also vice-president of the Electrical Refrigeration Corporation of Detroit, now the Kelvinator Corporation.

Mr. Davies was president of the United Engineering Society from 1920 to 1923. From 1920 to 1928 he was a member of the research board of the Engineering Foundation. He was born in Swansea, South Wales, Oct. 13, 1862, and is president of Jacobs & Davies, Inc., consulting engineers, of New York City. He has been associated with many important electrical engineering enterprises.

Accounting Procedure to Undergo Revision

Revision and amplification of the recommended uniform accounting procedure is being undertaken by Nema's Cost Accounting Committee. Plans have already been laid that will give new impetus to the uniform accounting movement of the industry, and particularly to the activities in the sections of the associations.

The Standard Accounting and Cost System, now in its fifth edition, has been revised time and again. The committee recognizes, however, that this manual is devoted in large part to financial accounting procedure, and that the recommendations on cost accounting procedure have not been entirely comprehensive.

Now, the committee plans amplification of the manual so that it will comprise two parts: Part I—Manual of General Accounting, and Part 2—Manual of Basic Cost Accounting Procedure.

Four Men Join Nema Headquarters Staff

Four new men joined the NEMA staff in the headquarters office. They are W. O. Conway, E. S. Aumend, A. B. Smith and R. J. Blais.

W. O. Conway, formerly Director of Education for the American Arbitration Association, joined the headquarters staff of the National Electrical Manufacturers Association on June 9. He will assist in carrying on the increasing staff duties required by the expansion of the Association's activities.

W. O. Conway

In his Association, legal and publicity work, he has had extensive experience which should make his services valuable to the Association. In the American Arbitration Association his duties involved legislation, public relations and representation of the association in this country and Europe. In his own business for five years he handled publicity and promotion for associations, institutions, business organizations and individuals.

E. S. Aumend was formerly assistant to the president of the Commercial Credit Corp. In his connection during the past year with the corporation he has just left, his duties were the general supervision of branches in New England, New York and New Jersey. He devoted particular attention to the development of the sales ability and efforts of the various branch managers. He also supervised the contacting with and closing of the larger accounts.

Previous to that connection he spent a period of ten years with the Willys-Overland, Inc., progressing from a clerk to department head and executive. His experiences and duties were of a broad nature, and covered the development of wholesale and retail operations, control of financing, both wholesale and retail, and the responsibility for the accounts and notes receivable of one of the larger branches. He also functioned as the New York branch manager of the organization's subsidiary retail finance company and was in charge of all litigation for that company in the eastern territory under the direct supervision of counsel at the factory.

He is a graduate of Marietta Academy and Marietta College with an A.B. degree in the class of 1917.

R. J. Blais has been, for the last ten years, United States Vice-Consul at Havre, France. In his former capacity he engaged in varied consular work, specializing in commercial reporting, namely, gathering information for use in making commercial reports and replies to inquiries on behalf of American exporting firms for the furtherance of American trade in Europe.

During 1917 to 1919 he served in the Judge Advocate General's Department of the United States Army, A. E. F., in France, and with the Army of Occupation in Germany and Luxemburg, being engaged in court martial work and criminal investigations. He has traveled extensively throughout western Europe.

He is a graduate of the Albany Law School with LL.B. degree, and was admitted to the New York Bar in 1917.

The Casualty and Fire Prevention Committee on account of its increasing work found it necessary to have a permanent full-time secretary. For this purpose Mr. Smith, formerly of Underwriters' Laboratories, was engaged by NEMA.

Mr. Smith was in the electrical department of Underwriters' Laboratories from 1923 to 1930. There his duties consisted of investigating and reporting on electrical wiring materials and utilization and control devices from a primary standpoint of fire and accident hazard, and developing and preparing standard requirements for such equipment.

Formerly he had been with the Westinghouse Electric & Mfg. Co. in production and sales work and in the operating department of the United Electric Light & Power Co.

He is a graduate (1916) of Sheffield Scientific School of Yale University.

Floodlighting Section Name and Scope Changed

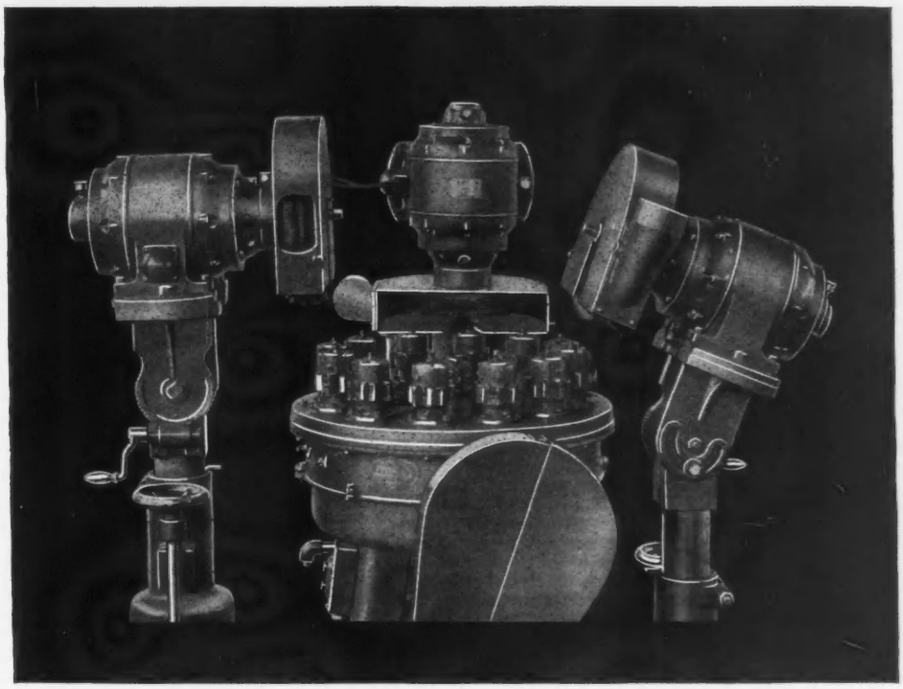
The Board of Governors of Nema has approved the request of the Floodlighting and Airport Lighting Section that the name of the Section be changed to Flood Lighting Section. The Board has also approved the recommendation of the Section that its scope be limited to floodlighting only, eliminating airport lighting.

Next Nema Meeting to Be at Point Comfort

The location of the next Annual Meeting of NEMA will be Old Point Comfort, Va., where the meeting will be held in the Chamberlain-Vanderbilt Hotel during the week of October 20. The reason for this choice was its ideal layout which affords excellent opportunities for sports.

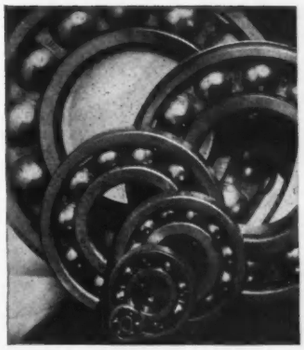
Practically all of NEMA's Sections, Divisions and Committees will hold meetings, most of them being required to do so for purpose of electing officers. On account of this and the attractiveness of the location and hotel, a very large attendance is expected.

NEW DEPARTURE BALL BEARINGS



from
any
angle

New Departures do their stuff

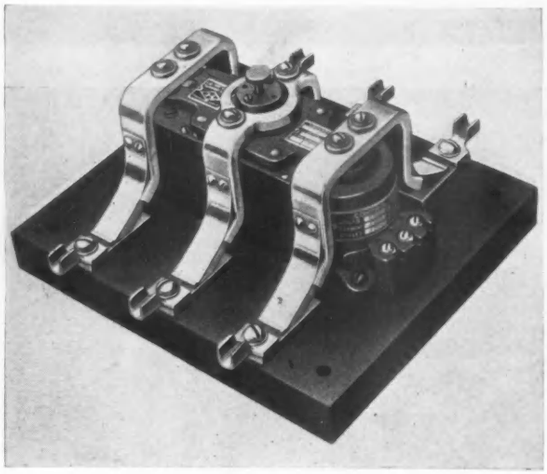


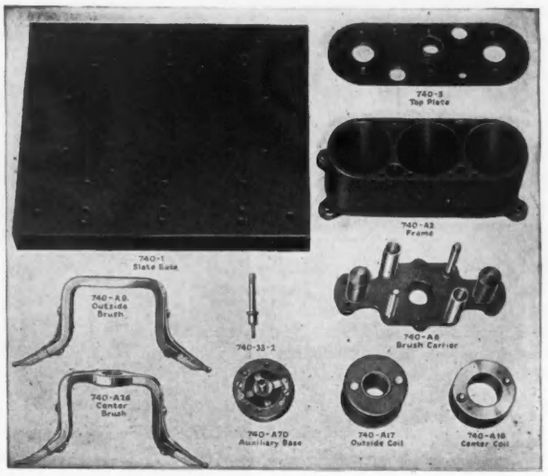
● Out of the ordinary is this installation of three Westinghouse motors on a special buffing machine. Each motor-driven buffer is adjustable to any angle from horizontal to vertical. Hard on the bearings? Decidedly not. New Departures are used. ● Thrust loads from buffing on side of the wheels and the weight of rotor are easily cared for because New Departure close curvature ball bearings have ample axial and radial load-carrying capacity. Maintenance and lubrication costs are irreducibly small. ● Such spectacular examples serve to emphasize the more clearly the uniform advantages of New Departures in the regular run of work. ● The New Departure Manufacturing Co., Bristol, Connecticut.

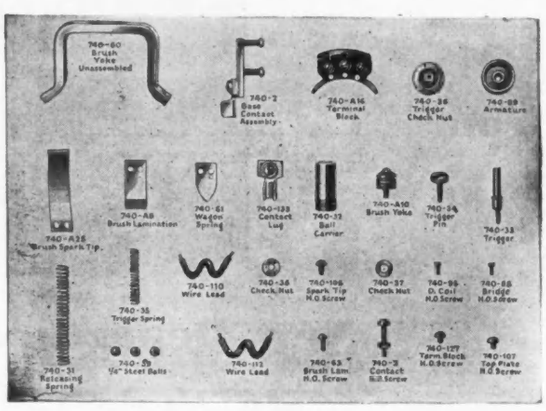
1536

NOTHING ROLLS LIKE A BALL

Remote Switch Components







REMOTE control switches of the type illustrated above are manufactured in 30, 60, 75, 100, 150, 200, 300, and 400 ampere sizes. The switch consists of two closing and one opening coils in a cast iron frame, together with a circuit breaker and mechanical ball locking device. Switches of this type are used extensively with auxiliary switches, tank switches, pressure gages, thermostats, and momentary contact switches. This switch can be used also for controlling self-starting single phase induction motors, and for single phase repulsion motors up to about 7½ horsepower. This type of switch is made with from one to eight poles.

ELECTRICAL MANUFACTURING *acknowledges the assistance of the Hart Manufacturing Company, Hartford, Conn., in the preparation of the above illustrations and the compilation of the accompanying remote control switch components. The illustrations show the parts of a typical remote control switch, and the table below gives the title and material of each part. Each part is numbered and each part number is referred to in the table. This gives an idea of the variety of materials used in this type of product*

Table of Parts and Raw Materials Used in Remote Control Switches

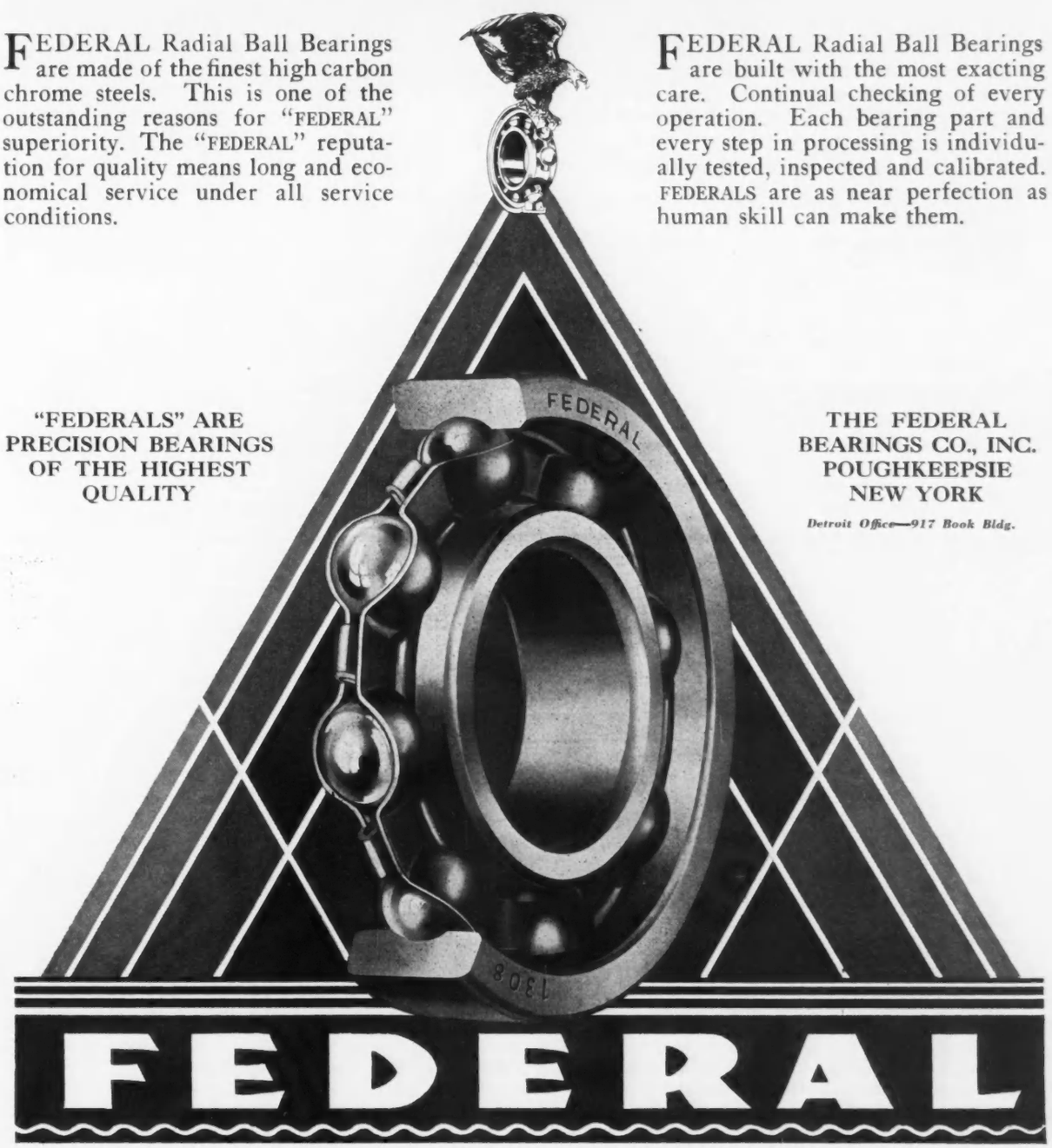
Part No.	Title	Material	Part No.	Title	Material
740- 1	Base	Slate	740- 61	Wagon spring	Steel
740- A2	Frame	Cast iron	740- 133	Contact lug	Copper
740- 3	Top plate	Steel	740- 32	Ball carrier	Steel
740- A6	Brush carrier assembly	Steel, soft iron	740-A10	Spool assembly	Mica
740- A9	Outside brush assembly	Copper	740- 34	Trigger pin	Steel
740-A26	Center brush assembly	Copper	740- 33	Trigger	Steel
740- 60	Brush yoke only	Copper	740- 31	Releasing spring	Steel
740-A70	Auxiliary base	Bakelite, silver brass	740- 35	Trigger spring	Steel
740-A17	Outside coil, 110v. ac.	Brass, fiber, steel, copper	740- 110	Wire lead	Copper
740-A18	Center coil, 110v. ac.	Brass, fiber, steel, copper	740- 36	Check nut	Steel
740-A19	Outside coil, 220v. ac.	Brass, fiber, steel, copper	740- 106	Spark tip H.O. screw	Steel
740-A20	Center coil, 220v. ac.	Brass, fiber, steel, copper	740- 37	Check nut	Steel
740-A21	Outside coil, 110v. dc.	Brass, fiber, steel, copper	740- 96	O. coil H.O. screw	Steel
740-A22	Center coil, 110v. dc.	Brass, fiber, steel, copper	740- 88	Bridge H.O. screw	Steel
740-A23	Outside coil, 220v. dc.	Brass, fiber, steel, copper	740- 39	Locking balls	Steel
740-A24	Center coil, 220v. dc.	Brass, fiber, steel, copper	740- 112	Wire lead	Copper
740- 2	Base contact assembly	Copper	740- 63	Brush laminations H.O. screw	Copper
740-A16	Terminal block	Cold molded insulation	740- 3	Contact H. O. screw	Steel
740- 36	Trigger check nut	Steel	740- 127	Term. block H. O. screw	Steel
740- 89	Armature	Soft iron	740- 107	Top plate H.O. screw	Steel
740-A25	Brush spark tip	Copper	740- 134	Barriers	Slate
740- A8	Brush laminations	Copper	740- 135	Slate barrier H.O. screw	Steel

THE FINEST STEELS OBTAINABLE ARE USED IN FEDERAL BEARINGS.

THAT IS ONE REASON FOR THEIR OUTSTANDING LEADERSHIP.

FEDERAL Radial Ball Bearings are made of the finest high carbon chrome steels. This is one of the outstanding reasons for "FEDERAL" superiority. The "FEDERAL" reputation for quality means long and economical service under all service conditions.

FEDERAL Radial Ball Bearings are built with the most exacting care. Continual checking of every operation. Each bearing part and every step in processing is individually tested, inspected and calibrated. FEDERALS are as near perfection as human skill can make them.



"FEDERALS" ARE PRECISION BEARINGS OF THE HIGHEST QUALITY

THE FEDERAL BEARINGS CO., INC.
POUGHKEEPSIE
NEW YORK

Detroit Office—917 Book Bldg.

Distilled Out of the Tariff Act

(*Continued from page 36*)

Raw Materials and Parts	RATE OF DUTY Fordney-McCumber Tariff 1922	Hawley-Smoot Tariff 1930
Cork insulation	30%	2½¢ bd. ft.
Manufacturers of cork, not specially provided for	30%	45%
Diamonds, rough or uncut	10%	Free
Other instrument jewel stones, cut but not set for jewelry	20%	10%
Electrical insulators and other articles of synthetic phenolic resin, etc., not specially provided for (lb.)	30%	25¢+30%
White, bleached beeswax	25%	30%
Bleached beeswax	Free	30%
Garnet, in grains (lb.)	Free	1¢ lb.
Garnet ground, and manufacturers of	30%	20%
Abrasives, natural and manufactures of, containing more than 1/10% of vanadium, 2/10% tungsten, molybdenum, boron, tantalum, columbium, niobium, or uranium or 3/10% chromium, in grains	1¢ lb.	60%
Finished Electrical Products		
All articles suitable for producing, rectifying, modifying, controlling or distributing electrical energy;		
Electrical telegraph (including printing and typewriting), telephone, signaling, radio, welding, ignition, wiring, therapeutic and X-ray apparatus, instruments (other than laboratory), and devices; and articles having as an essential feature an electrical element or device, such as:		
Electric motors, fans, locomotives, portable tools, furnaces, heaters, ovens, ranges, washing machines, refrigerators and signs, and parts thereof, finished or unfinished, wholly or in chief value of metal and not specially provided for	30%	35%
Table, household, kitchen and hospital utensils, and hollow or flat ware, not specially provided for, whether or not containing electrical heating elements or constituent parts thereof:		
Plated with platinum or gold	60%	65%
Plated with silver		50%
Iron or steel, enameled or glazed (lb.)		5¢+30%
Aluminum	11¢+55%	8½¢+40%

We Expect to Be Jobber Fans for a Good Long Time

(*Continued from page 41*)

at reasonable intervals. On his first call, he learns what electrical equipment the customer is using, and what his electrical needs and problems are. If Square D equipment is not already being used, he works for its introduction. On subsequent calls, the aim is to keep the customer "sold" on Square D products (we do not rely on the jobber for this). And, of course, there is now and then a new line for our man to introduce.

In all this, however, the individuals with whom we contact are those who influence specifications. We do not as a rule call upon the purchasing agent. But the jobber's salesman does.

The stove business I have just mentioned, for instance, came to us through the jobber because it did not originate with the engineers upon whom we had been calling. The purchasing agent was in charge of it and in his regular call upon the purchasing agent the jobber's man learned of it.

In one of the larger cities, there are a number of industrial plants so important that jobbers' representatives call on them every day. With six or seven jobbers in that city representing our company, and really active on our behalf because they appreciate the cooperation we give them and the business we turn over to them, it is plain that the Square D name must be mentioned to these very important purchasing agents a great many times in the course of a year. Certainly we ourselves, unaided, could not do an equally good job of missionary work in such quarters.

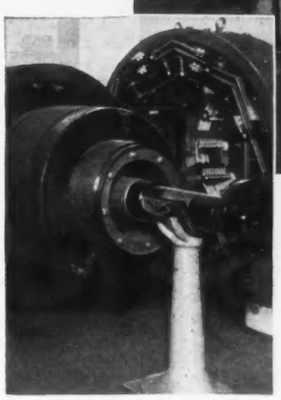
Not every jobber is really of value to us. Some are of great assistance, others do us no good whatsoever.

But it is only the aggressive jobbers we want. We believe in quality rather than quantity in jobber representation.

About once a year we go over our jobber list, and if we find any jobber inactive we are quite likely to withdraw our prices from him. Of course in this matter something depends on the territory in which the jobber is located.

Again, we are careful through whom we sell. Certain classes of switches can be sold through almost anyone who considers himself a distributor. But for the bulk of our products we will not quote prices except to those we believe will actively and adequately represent us.

We are particularly careful, of course, with control apparatus. We will sell control only to those jobbers who can carry stock and turn it over. This means, in part, that they must be doing a regular business with industrial plants.



Drums of G-E PROTECTION *for* YOUR EQUIPMENT

Out of its vast store of experience in laboratory, factory and field, General Electric offers you G-E Insulating Varnishes . . . the best varnishes that tremendous facilities and skilled workers can produce.

These are the varnishes that protect General Electric equipment. You can use them to protect yours.

There's a G-E Varnish for *every purpose.* Black varnishes, highest in dielectric strength, flexibility and moisture resistance . . . clear yellow, offering greatest resistance to abrasion . . . varnishes for fast or slow air drying or baking. *Whatever* varnish you need, General Electric can supply it.

G-E Varnishes give you *extraordinary quality* at *ordinary prices.* See your nearest General Electric Merchandise Distributor. Delivery is immediate. Or write Section M-327 Merchandise Department, General Electric Company, Bridgeport, Connecticut.

G-E INSULATING MATERIALS *for every purpose*

Varnishes, Oils, Shellacs, Paints

Filling and Sealing Compounds

Varnished Cloths and Tapes

Insulating Papers

Core Solder and Fluxes

Cords and Twines

GENERAL ELECTRIC

INSULATING MATERIALS

MERCHANDISE DEPARTMENT • GENERAL ELECTRIC COMPANY • BRIDGEPORT, CONNECTICUT

Our maintenance of direct contact with the user of electrical equipment while selling through jobbers has had many interesting results. It has brought us more than one new product of importance, through expression of an actual need by some man in industry. It has also brought to our attention facts which led us to acquire a manufacturing branch on the Pacific Coast.

In many respects the Pacific Coast is like another country. The conditions under which electricity is used in Southern California are different from anything we know elsewhere, and call for differences in apparatus.

For instance, Los Angeles bungalows have no basements. The entrance switch which in other parts of the country is placed in the basement, and really is a rather good looking piece of equipment, must as a rule be located in the entrance hall or some other room in the actual living quarters. Architects, therefore, like to take the entrance switch into consideration in their design. Usually they like to have it sunk into the wall, and for their purposes the ordinary entrance switch will not do.

Again, there is a difference in switches caused by the fact that electricity is commonly used both for house lighting and for ranges and water heaters. In order to keep down the maximum it is customary to have a special type of switch through which a water heater, if in use, is turned off before the range can be turned on.

A still further difference is caused by the low price for current. California does not want the meter protection device necessary in the East. Current is too cheap to steal. Californians say, and they actually prefer to have their switches unprotected against electric thievery.

These are but a part of the differences. And San Francisco is different from Los Angeles. In any case, our usual aggressive method of covering a territory through direct contact with the customer on behalf of the jobber brought forcibly to our attention the need for special design and special service in California. By associating ourselves with the former Diamond Electrical Manufacturing Company we have provided for these necessities.

All in all, our business has been growing quite rapidly these last several years. Excellent jobber connections, together with sound jobber policies, has been to as great a degree responsible for this as any single element can be.

In fact, we do not see how we could do the volume of business we do, at the cost we do, under any other method. To attempt another method would be to obligate ourselves to carry regular local stocks, to bill users of Square D products, and to take credit losses. As matters stand, we have practically no credit loss, for our careful and continuous selection of jobbers means that we have on our books virtually no accounts of which we are not certain.

We expect to be jobber fans for a good long time.

Manufacture and Test of Switchboard Wire

(*Continued from page* 60)

volt wire. It is desirable to test wire before installation both for dielectric strength and surface leakage. The dielectric tests should include the application of a definite voltage, supplied from an adequate source, on samples of the wire without bending and also a dielectric test on samples bent around a definite radius through, say, 90 degrees. The voltage requirements can be adjusted as desired. It is convenient and cheap to apply the voltage between the copper conductor and a band of metal foil wrapped tightly over the insulation and braid.

The surface leakage test can be made quickly and cheaply by applying the terminals of a portable testing set to the braid with a separation of two inches at a definite voltage for a definite time. If any steam or vapor is noticed, the leakage is excessive, or, if the insulation is hot to the touch after the test is completed, it also denotes excessive leakage.

Excessive leakage is most likely to occur if the wire is used very shortly after it is manufactured. The compounds used in the braid often require a certain amount of aging before they are satisfactory electrically.

IN forming the wire for placing on switchboards, numerous right angle bends are necessary. The use of ordinary wiring pliers for bending imposes a severe strain on the insulation and braid on the convex side of the bend. For this reason, the use is recommended of pliers or forming tools having a radius of one-half the diameter of the insulated wire for sizes 0.081 in. and 0.102 in. (numbers 12 and 10 B&S gage). Large sizes of wire are usually bent over a radius equal to six times their overall diameter. Wire properly manufactured should withstand these bends without difficulty, whereas, even a high grade wire is damaged more or less, if no precaution is taken to provide proper radii on bending tools.

When removing the insulation from the copper wire for terminals, it is very important to avoid nicking the wire in any way with the insulation cutters. A slight nick in the copper concentrates the stresses at that point, when the wire is bent, which results in the wire breaking. The principle is the same as that used in cutting glass. Even though the nicked wire is not broken off entirely, any vibration in the apparatus will tend to increase the fracture, which reduces the cross section of the wire and may create a hot spot.

The overall diameter of switchboard wire must necessarily be rather uniform throughout each length and between lengths as neat wiring cannot be done otherwise. Wiring cleats which are designed to hold say five wires in parallel, will do so only if the wire is kept within close limits.

Tinned wire is used almost exclusively for switchboard wiring as its use practically eliminates the possibilities of corrosion at terminals. Terminal corrosion, while affecting the metal parts mechanically, also usually produces high resistance contacts which may affect the electrical system.

SWITCHBOARDS are no exception to the modern trend in electrical design toward compact apparatus which is pleasing in appearance as well as efficient. The illustration on page 59 shows the rear view of a modern switchboard, showing the latest wiring method, known as "channel" wiring. When wiring by this method the long vertical runs of wire are concealed in the side channels of the steel boards, short horizontal runs being the only visible wiring on the board. This, while improving the appearance of the boards, also decreases the fire hazard.

A glance into the future of switchboard design indicates the use of switchboard wires having smaller outside diameter than the ones now in use. This will be necessary to conserve space. This reduction in diameter can be effected in a number of ways including the use of a smaller conductor and thinner braid covering.

It is well to remember that switchboard wire is made for switchboards and not vice versa; that is, switchboard wire design must always adapt itself to the changes in the apparatus of which it is a part.

Avoid the Costly Results of Early Bearing Failure

IT is now easy to find out exactly what kind of bearing should be used in any given application, and why. The electric motor or appliance manufacturer, who makes scientifically determined suitability the first consideration in the specification or purchase of a bearing, profitably safeguards the value and efficiency of the machine and the priceless asset of a good reputation.

New bearing knowledge, produced by the long continued and comprehensive research conducted by this company in collaboration with the United States Bureau of Standards and other scientific groups, reveals how the electrical machinery manufacturer can determine what are the essentials of bearing quality in his particular application, and how he can provide bearings that will harmonize with good engineering and conscientious construction.

Maximum bearing life, simplified machine design, economical assembly, ease and economy of replacement, which reduce cost and enhance value, can now be accurately provided for every bearing application.

This organization offers you this advanced metallurgical and engineering counsel, patterns and tools for over 30,000 designs, and 450 sizes of standardized "Ready Made" stock bearings, ready for instant delivery and immediate assembly. Consult Bunting on all bearing problems and requirements.

THE BUNTING BRASS & BRONZE CO.
TOLEDO, OHIO

BRANCHES AND WAREHOUSES AT
NEW YORK CHICAGO BOSTON
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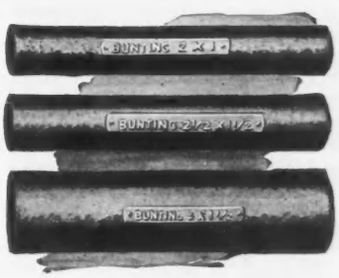


Scientifically Made Bronze Bearing Metal

Bunting Quality Phosphor Bronze is available in hundreds of different sizes of Cored and Solid Bars. 88 different sizes are constantly carried in stock by leading mill supply wholesalers in all markets and at the Bunting factory and branch warehouses. The ease and economy with which this perfect metal is made into bearings and bronze parts required in maintenance and production and the high character of the result have made it the outstanding bearing metal used in industry today. Write for detailed data.

Electrical Maintenance Engineers Meet, Discuss and Elect

Electrical maintenance engineers—273 of them—registered at a convention held at Cedar Point, Ohio, on June 19 and 20. It was the aim to make this an annual affair, and the attendance at this initial convention assures the continuance from year to year, as planned.

There were four business sessions, each lasting two hours, and a convention dinner. J. E. North, president of the Electrical League of Cleveland, acted as convention chairman. The following heads of the more important maintenance groups acted as chairman at the individual sessions: Earl Wilks, Cleveland Electrical Maintenance Engineers Association, president; W. L. McCaslin, Chicago president; George Owens, president of the Industrial Electrical Engineering Society of Detroit, and E. J. DelVecchio, president of the Akron Electrical Maintenance Engineers Association.

The session opening speaker was A. W. Berresford, managing director, NEMA. Maintaining the factory electrical system so as to decrease interruptions was discussed at the first session by four electrical maintenance engineers. This was followed by addresses on the application and maintenance of motors by R. H. Rogers, Industrial Engineering Dept. General Electric Co. losses resulting from undervoltage burning of lamps by W. Sturrock, Engineering Dept., Nela Park, Cleveland; and application of graphic recording instruments by A. B. Beach, Ludwig Hommel & Co., Cleveland.

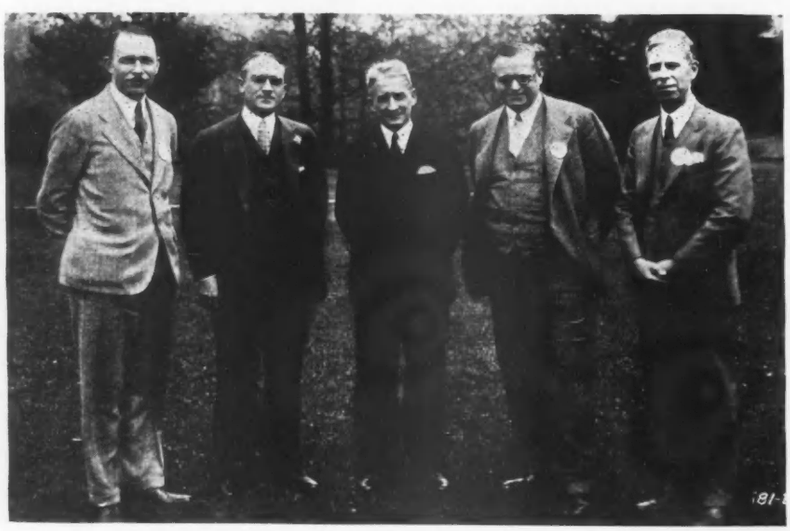
At the second session four electrical maintenance engineers discussed the benefits they have derived from the use of synchronous motors, and this was followed by addresses on high frequency tools by R. W. Proctor, general sales manager, Van Dorn Electric Tool Co., Cleveland; what wears out on overhead cranes—where, why and how to fix it, by E. T. Bennington, Cleveland Crane & Engineering Co., Wickliffe, Ohio.

At the Friday morning session the portion of the program given by the maintenance engineers themselves was on the use and maintenance of electric ovens and furnaces.

Following this were addresses by J. F. Lincoln, Lincoln Electric Co., Cleveland, on modern manufacturing with the arc welder; by Glen E. Guy, Baker Industrial Truck Co., Cleveland, and C. B. Cook, Elwell-Parker Co., Cleveland, on the use and maintenance of electric industrial trucks.

At the final session fuses and protective devices were discussed by E. M. Lindahl, Economy Fuse & Manufacturing Co.; uses of wiring devices and the part they play in grounding systems, by Floyd E. Riling, sales engineer, Harvey Hubbell, Inc., Bridgeport, Conn.; and use and maintenance of motor starters and controllers, by J. McPrice, district manager, Allen-Bradley Co., Chicago.

Swope Attends Edison Sales Conference



Gerard Swope, president of General Electric, poses with the sales committee of the Edison Lamp Works at the Edison General Sales Conference in Nela Park, Cleveland. It was the first time in the history of the lamp works that the entire force was brought together. Left to right: H. F. Barnes, assistant general sales manager; E. E. Potter, general sales manager; Mr. Swope, P. D. Parker and O. P. Anderson

Lee Elected President of Electrical Engineers

William S. Lee, consulting engineer and president of the W. S. Lee Engineering Corporation, Charlotte, N. C., was elected president of the American Institute of Electrical Engineers for the year beginning Aug. 1, 1930. The election took place at the annual meeting of the institute at Toronto, Ontario, June 23.

William S. Lee

The other officers elected were: Vice-presidents, I. E. Moultrop, Boston; H. P. Charlesworth, New York City; T. N. Lacy, Detroit; G. C. Shaad, Lawrence, Kan., and H. V. Carpenter, Pullman, Wash. Directors, A. B. Cooper, Toronto; A. E. Knowlton, New York City, and R. H. Tapscott, New York City. National treasurer, George A. Hamilton, Elizabeth, N. J. (re-elected).

These officers, together with fifteen holdover officers, will constitute the board of directors for the next administrative year beginning Aug. 1. Harold B. Smith of Gloucester, Mass., is the retiring president.

Chesney Leaves G. E. Post: Burrows Succeeds

Vice-President Cummings C. Chesney, chairman of the manufacturing committee of the General Electric Company, was relieved at his own request on July 1 and was succeeded by William R. Burrows. Since May 25, when Messrs. Chesney and Burrows were elected vice-presidents, they have been serving together as manufacturing officials of the company. Mr. Chesney is a pioneer in the electrical industry, having been associated in early life with William Stanley, developer of the transformer. He has had more than 42 years of continuous service with the General Electric and the Stanley companies. Immediately after his retirement, Mr. Chesney left on a tour of the many plants associated with the General Electric Company.

PYROXYLIN LACQUERS

Regardless of what your finishing problem may be, the complete facilities of our Service Laboratory are constantly at your disposal without cost. Here scientific knowledge brings about the most practical and economical solution. "The Acknowledged Standard Since 1884."

WHEN you choose a lacquer today nothing should be taken for granted.

To develop in lacquer the highest degree of quality and uniformity requires the strictest adherence to scientific standards.

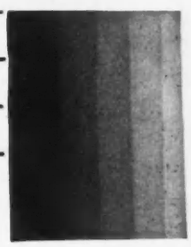
In our laboratories absolute control at all times over basic raw materials and chemical processes—continuous research—constant experimental testing and checking, have made Zapon Pyroxylin Lacquers superior for every use. This explains why it is decidedly more economical and satisfactory to insist on Zapon.

Upon the confidence of the buyer rests the reputation of Zapon steadily growing through nearly a half century to undisputed leadership.

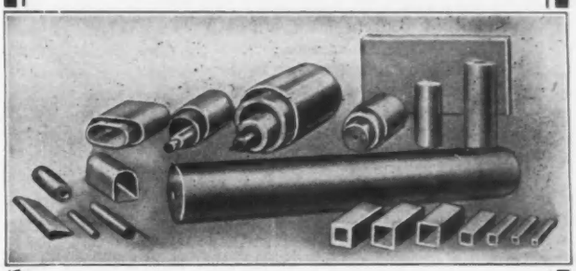
THE ZAPON COMPANY

STAMFORD, CONN.

ZAPON



Quick Delivery



All kinds of Insulation

Bakelite, Insuline, Hard Rubber, Ebony Asbestos Wood, Vulcanized Fibre, Transite, Fish Paper.

Sheets, rods, and tubes of all thicknesses and dimensions—furnished to manufacturers, experimenters and laboratories on short notice—24 hour service.

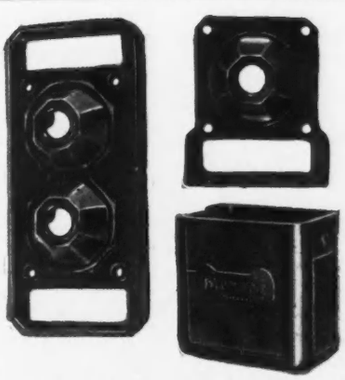
Furnished either in plain material or completely cut, drilled, engraved or stamped to specifications.

Complete machine shop for drilling, engraving and stamping.

No Order Too Large or Too Small

INSULINE CORP. OF AMERICA

78-80 Cortlandt St. New York, N. Y.



Mouldings
...and metal parts

The Waterbury Button Company manufactures both of these important electrical parts within the one organization—insuring completed products of standard quality throughout, at an appreciable saving to you.

We are specialists in moulded BAKELITE, also making mouldings of Durez, Lumarith, Shellac and other compounds, for any requirement.

Every-day items such as terminals, knobs, plugs, and cord ends are always carried in stock. Also ferrules in 150 sizes and eyelets in 200 sizes in any metal or finish are stocked in large quantities ready for immediate shipment.

Let us tell you how we can save you money on moulded parts.

WATERBURY BUTTON COMPANY

Established 1812

Main Office and Factories at WATERBURY, CONN., U. S. A.

WATERBURY BUTTON CO.
Electrical Mfg. Dept.
Waterbury, Conn.

Gentlemen: Kindly send free sample card of Eyelets, Terminals and Ferrules.

☐ Am also interested in saving money on Moulded Parts.

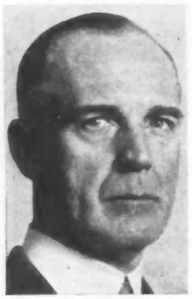
Name .....

Street .....

City .....

Sawyer Is President of New Neon Subsidiary

Claude Illumination Company is the firm name of the new concern incorporated by Claude Neon Lights to manufacture and market illuminating devices in the low-voltage field of gaseous tube lighting. The new company is a Delaware corporation with a capitalization of 100,000 shares of common stock with a nominal par value of $1. Of this amount, 45,000 shares will be issued shortly, none of which will be for public subscription.



Leroy P. Sawyer

Leroy P. Sawyer is president of the new company. His entire career has been in connection with General Electric Mazda Lamp interests. Later he was chairman of the sales organization of the Claude Neon national lamp works in the New York office of the company. Soon after he was elected vice-president of the R. C. A. Photophone, Inc. Other officers and directors of the new firm will be men prominently identified with the Claude Neon interests. Claude Illumination Company will manufacture products which lend themselves to quantity production from centrally located factories.

G. E. Unemployment Plan Announced

An unemployment plan for General Electric workers, designed to make funds available for employees during times of need or unemployment, has been announced by President Gerard Swope. The money will be raised through equal contributions by the employees and the company.

At the same time Mr. Swope announced a plan for the stabilization of employment by reducing to a minimum the cause and effect of unemployment. Rules are set down for all factories as to what to do and what not to do when business is either on the increase or falling off.

By enrolling, the participant agrees to pay into a trust fund created by the plan approximately one per cent of his actual weekly or monthly earnings for a period of three years. In case of abnormal times of unemployment, normal contributions by participating employees would cease and all employees would be called upon to contribute.

Vacation for 69,000 Western Electric Workers

Probably the largest industrial vacation exodus on record will take place during the last two weeks of July, when 69,000 of the 75,000 employees of the Western Electric Company take their holidays.

One of the problems in the granting of vacations to all classes of workers within a single industrial institution is the avoidance of interruption in production. The Western Electric Company tried last year a plan whereby the taking of vacations at the company's main manufacturing plant at Hawthorne, Ill., was concentrated within a period of two weeks. This gave vacations to all workers at the time of year most of them preferred their holidays. This year the standard vacation plan is being extended to include all three of the principal plants of the company.

N. E. W A. Gets Preliminary Cost Survey

A preliminary report on a study of electrical distribution costs, made at the annual convention of the National Electrical Wholesalers' Association in Hot Springs, Va., May 29, pointed out, among other things, the highly unprofitable results to be obtained from sales scattering. Concentration in one territory was shown to be much more beneficial than sales widely disseminated over large areas.

The report, which was made by the Domestic Commerce Division, was based on first-hand surveys in wholesale electrical establishments, and represented sales and cost figures compiled over a three-year period.

Immediately following the last session of the convention, the executive committee met and selected Bonnell W. Clark, general manager of Westinghouse Electric Supply Company, New York, as its chairman, and E. J. Coyle, president of the Colonial Electric Company, Inc., of Philadelphia, vice-chairman.

F. R. Elliott, of the Elliott-Lewis Electrical Company, Inc., Philadelphia, Pa., was elected chairman of the Atlantic Division, and C. J. Litscher, head of the electrical company bearing his name in Grand Rapids, Mich., chairman of the Central Division.

The fall meeting of the N.E.W.A. will be held in the Hotel William Penn at Pittsburgh, Pa., Nov. 10 to 14.

Elmer Sperry, Electrical Inventor-Genius, Dies

One of the most prolific inventors of all time was lost to humanity on June 16 when Dr. Elmer A. Sperry, inventor of the gyroscope, the dynamo and numerous other mechanical and electrical devices, died at the age of 70 after an unsuccessful operation for gallstones.

More than fifty years of Dr. Sperry's life was devoted to invention. At his death he was said to have taken out more than 400 patents. His gyroscope for the stabilization of ships and airplanes is his best known invention, though not the most unusual. Recently a giant army bombing plane equipped with two Sperry gyroscopes flew from Sacramento to San Francisco without the guidance of human hands. Dr. Sperry also invented the gyro compass, which eliminated the variations due to the earth's magnetism.

He perfected new systems of street lighting, new machinery for mining, electric devices for trolley cars, the electric automobile, a lighting system for motion picture projection, an electric arc light, a high-power searchlight and various electrochemical processes.

Mineral Felt Distributors to Meet in Toledo

The annual sales convention of the Mineral Felt distributors and dealers will be held in Toledo, Ohio, July 25 and 26, according to an announcement just made by Frank C. Russell, president of the Mineral Felt Insulating Company. While the complete program has not been released as yet, the meeting will be supervised by a number of men who are authorities in their respective fields, Mr. Russell said.

Frank C. Russell

A large number of new dealers have become a part of the Mineral Felt organization since the 1929 convention, and it is expected that more than 400 dealers and distributors will attend the convention from all sections of the United States and Canada. The Mineral Felt Company is expected to surmount the million-dollar mark for sales in 1931, Mr. Russell said.

R. C. A. Plans Radio Schools to Train Men

The need for specially trained men in the various departments of the radio industry has prompted the Radio Corporation of America to arrange for the opening next September of five new radio institutes, according to R. L. Duncan, president of the R. C. A. instructional units.

The organization already has five of these schools for radio specialists in operation. The inception of the new ones will bring the total number of institutes to ten. The new branches will be located in Cleveland, Chicago, New Orleans, San Francisco, and Los Angeles, and will augment those now in operation at Boston, Newark, Philadelphia, Baltimore and New York. Courses will be started in the fall with day and night classes in radio theory and practice. All classroom equipment, Mr. Duncan said, will be of the latest and most approved type.

Pictures to Aid Salesmen of Benjamin Electric

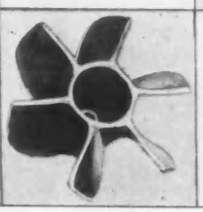
Guided by the principle that photographs of good lighting installations are a valuable asset to the salesman selling a lighting job, Benjamin Electric Manufacturing Company, Des Plaines, Ill., has inaugurated a plan authorizing company representatives, distributors and central station lighting men to place orders locally in practically every city in the country for the photographing of Benjamin lighting installations, to be charged to the account of the manufacturer.

The instructions to photographers in more than 100 cities throughout the country call for one day view and one night view of any one completed installation

Whether you manufacture a Quality Product or one which is highly competitive—

our thirty-three years' experience in Hard Rubber Moulding puts us in an unusual position to meet your every requirement. Send us your drawings and specifications for an estimate. They will be held in the strictest confidence.

PLASTICS *in Every Conceivable Form*



Moulders Since 1897

HARD RUBBER *in Every Conceivable Form*

Look for the Circle S

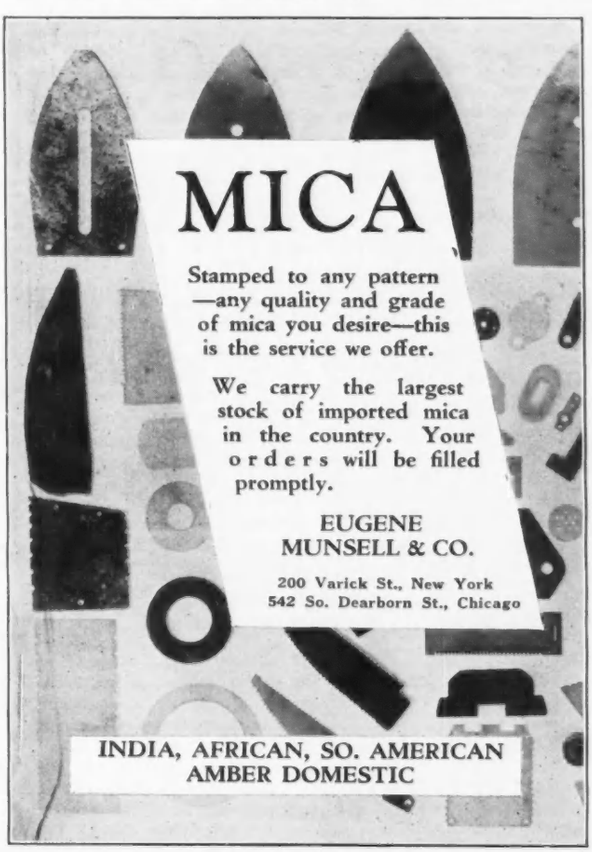
The Mark (S) of Quality

Jos. Stokes RUBBER CO.

Trenton N.J.

Canadian Plant, Welland, Ontario

Stokes Hard Rubber Products in Every Conceivable Form are advertised regularly in the Saturday Evening Post.



MICA

Stamped to any pattern —any quality and grade of mica you desire—this is the service we offer.

We carry the largest stock of imported mica in the country. Your orders will be filled promptly.

EUGENE MUNSELL & CO.

200 Varick St., New York
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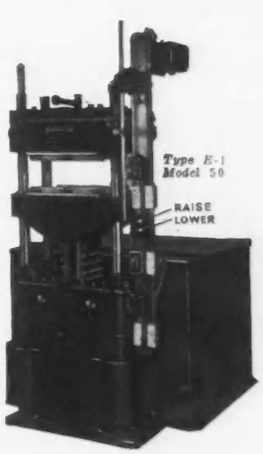
INDIA, AFRICAN, SO. AMERICAN AMBER DOMESTIC

Mold your own parts with this one machine

In owning this ELECTRO-DRAULIC molding press you have a complete molding unit in your own plant—keeping profits where they belong.

The ELECTRO-DRAULIC molding press reduces molding problems to a very simple matter—you own and use your own molds.



Our bulletin entitled "Synthetic Hot Moulding" will be of interest to all plant executives who wish high quality but low cost moulding.

The ELECTRO-DRAULIC is complete in itself.

No attachments required. Simple to operate—economical and productive.

TERKELSEN MACHINE COMPANY

Terkelsen Building

BOSTON, MASS., U. S. A.

If more than one view of an installation is desired, approval for extra pictures may be secured by writing the manufacturer. The night view with lights on is intended to show the general effect, while the day view with lights off is intended to show details of the installation, mounting height and spacing of units.

"Before pictures" of the old installation, day and night views are also suggested. To produce the best effect, conditions "before" and "after" should as nearly as possible be the same.

April Exports Drop ¾ Million

A drop of three-quarters of a million dollars was registered during the month of April in electrical exports from the United States as compared with the value of the outgoing goods at the same time last year. The total valuation of the exports amounted to $11,456,561. Last year in April they were $12,194,998. These figures were contained in the report of the Electrical Equipment Division of the Department of Commerce.

Radio receiving sets valued at $649,294 went out of the country during the month. This was one of the only products that showed a substantial gain. Its exports last year amounted to $343,111. Stationary motors dropped from $417,561 last year to $303,387, while exports of flashlight batteries dropped from $378,673 a year ago to $316,338. Electric refrigerators to the value of $1,240,459 were exported during the month. Electric fans rose from $109,859 to $158,943 over the year. The other product whose jump was marked was the vacuum cleaner, which increased in exports from $67,402 last year to $204,818.

Sweden was the largest contributor in electrical imports during April with products valued at $169,860.

New Refrigeration Rules Are Issued

A set of rules governing the installation of refrigeration systems was issued recently in Chicago by George E. Nye, chief inspector of the Department for the Inspection of Cooling Plants, Steam Boilers and Unfired Pressure Vessels.

The rules are addressed to architects, engineers, manufacturers and contractors, and have for their authority Sections 3679 and 3683 of the Chicago Municipal Code of 1922.

Grigsby-Grunow to Employ 15,000 People

An event which may indicate the return of general business to a normal basis was revealed when William C. Grunow, president of the Grigsby-Grunow Company, Chicago, announced plans providing for the employment of 15,000 people during the next month or so. Of this number, 10,000 were given jobs on June 2 to speed up the production of 4000 radio sets a day. The remainder will be needed when the new Majestic Electric Refrigerator is put in production some time this month. Mr. Grunow stated the company had received orders for more than a million refrigerators.

Clarkson Resigns Post as Nema Official

Stewart N. Clarkson, until recently assistant to director of the National Electrical Manufacturers Association, has severed his connections with that organization to go into business for himself. He plans to build up a small trade association somewhat similar to Nema, but on a smaller scale, which would render an intimate service to a few groups of competitive manufacturers.

Stewart N. Clarkson

Mr. Clarkson functioned in a similar manner as executive secretary of the Electric Power Club for five years and for the product sections of Nema since its formation in 1926. During the past three years he has organized in cooperative trade association groups, manufacturers of furnaces, refrigerators, carbon brushes, molded products, lighting equipment and signalling apparatus to promote the interests and improve the conditions in their respective industries. His former activities were devoted to the merchandising, manufacturing and public utility branches of the electrical industry.

W. C. Bryant, of Bryant Electric Co., Dies

From Colorado Springs comes word of the sudden demise of Waldo Calvin Bryant, chairman of the board of the Bryant Electric Company, Bridgeport, Conn.

Mr. Bryant died on July 5. Just two weeks previously he had left for the West in the hope that the climate would improve his health. At the Glockner Hospital, Colorado Springs, he was found to be suffering from an embolism and underwent an operation last week.

A native of Winchendon, Mass., Mr. Bryant was of old English stock and traced his family descent through William Cullen Bryant. He established a small shop in Bridgeport for the manufacture of electrical appliances, and in July, 1889, incorporated the Bryant Electric Company with a capital stock of $5,000. The business grew from a small workshop to a $3,000,000 firm employing 2000 persons, with offices in New York, San Francisco and Chicago. Mr. Bryant sold his interest in the firm to Westinghouse in 1921, but remained as president and general manager until 1927 when he became chairman of the board. He was a director of the First National Bank of Bridgeport.

Westinghouse Organizes New X-ray Company

Development and perfection of the X-ray was cited as the reason for the latest step of Westinghouse Electric and Manufacturing Company in entering the X-ray field through a newly organized $2,000,000 company known as the Westinghouse X-ray Company, Inc.

Two of the largest concerns in the field, the Wappler Electric Company, Long Island City, N. Y., and the American X-ray Corporation, Chicago, will become identified with this organization. Westinghouse X-ray will have back of it the resources of the Westinghouse Research laboratories. The officers of the new corporation are A. E. Allen, president; Calvert Townley, vice-president; Warren H. Jones, secretary, and T. J. Illing, treasurer.

The Wappler company is widely known in the medical and hospital world for its valve tube rectifier, X-ray generators, and so-called "radio knife" for bloodless surgery. Its products include a complete line of X-ray accessories.

Manhattan Electric Goes to American Machine

The reorganization of the Manhattan Electrical Supply Company, Inc., under the name of American Machine and Metals, Inc., was brought to light on July 2, when the latter concern applied to the Stock Exchange to list 226,875 of an authorized issue of 500,000 common shares.

Richard H. Brown, former president of the Manhattan Electrical Supply Company, who resigned following the crash of Manhattan common stock on the market, has been succeeded by C. K. Woodbridge, of Prince & Whitley. American Machine and Metals, Inc., will function as a holding company with the following subsidiaries: Trout Mining Company, Halliwell-Shelton Electric Corporation, E. D. Anderson, Inc., Troy Laundry Machinery Company, Inc., United States Manganese Corporation and Manhattan Electrical Supply Company.

Industrial Lighting Bill Passes House

A Bill introduced by Congressman Albert H. Vestal of Indiana, which would extend copyright protection to designers of industrial products and which was backed by the Artistic Lighting Equipment Association, has passed the House of Representatives and is now in the Senate awaiting confirmation. This was announced by Charles L. Benjamin, managing director of the lighting association.

Consider Standard Tube Replacement Policy

A standard replacement policy is being considered by radio tube manufacturers of the Radio Manufacturers Association. A questionnaire is being circulated among manufacturers to ascertain fully the trend of opinions as to future policies of the tube makers. About 40 representatives of tube manufacturers in the R.M.A tube group met at Atlantic City during the R.M.A. convention and trade show.

PROPERLY MOULDED BAKELITE PARTS

insure absolute accuracy and exact uniformity in your product. They save time in assembling, eliminate expensive machining operations and lower your manufacturing costs. They require neither buffing nor polishing, yet have a fine and lasting finish—in colors if desired. Their tensile and dielectric strength is high—they are unaffected by moisture, oils and most acids. Ours is the largest plant in the Middle West devoted exclusively to the manufacture of moulds and custom moulding of Bakelite parts.

Write for our catalog.

Chicago Moulded Products Corp.

2144 Walnut Street :: Chicago, Illinois

Subsidiary to Plymouth M'f'g Co.

REFRACTORIES

on a 50/50 basis.

We *manufacture* and *sell* refractories.

We insure *quality* and *service.*

The leading manufacturers of electric furnaces and ranges have made "Electrical Refractories" their standard because—

Electrical Refractories are true to specifications and cleanly moulded,

and

are made of the correct formula to meet your requirements.

When using *Electrical Refractories* you are assured of quick, economical, and intelligent service.

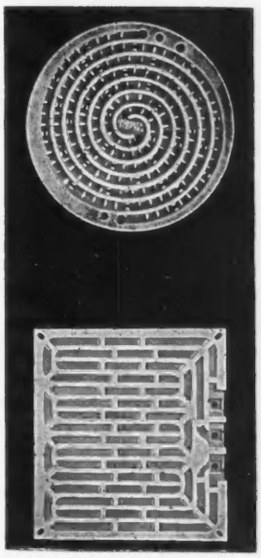
Send your inquiries for detailed information and quotations to

ELECTRICAL REFRACTORIES CO.

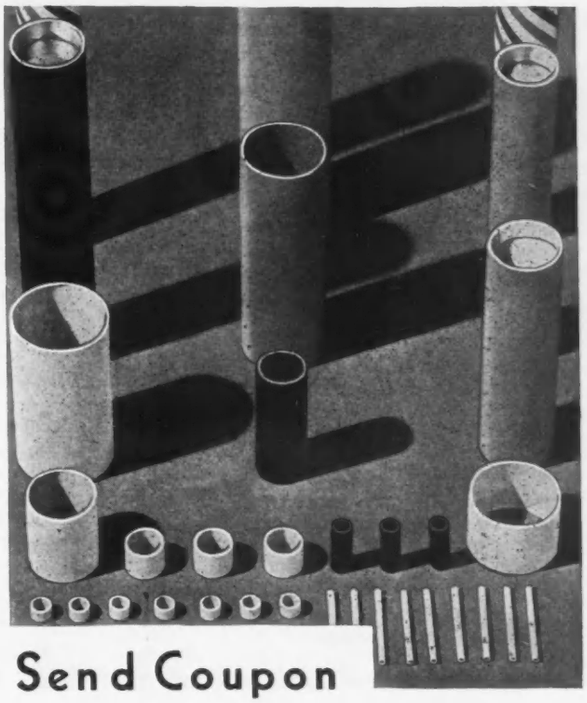
50 CLARK STREET

EAST PALESTINE, OHIO

CHICAGO—*G. D. Wilson,* 645 Washington Blvd.
DETROIT—*R. J. Scothorn,* 145 Eastlawn Ave.
ST. LOUIS—*R. V. Hughes* 1701 Washington Ave.
SAN FRANCISCO—*E. A. Wilcox Co.,* 273 7th St.



STONE'S PAPER TUBES



Send Coupon for Samples of These Money Savers

Stone's Paper Tubes save money in electrical manufacturing because they save time, trouble and labor. Use them to protect armature shafts, threaded shaft ends, etc., when painting or varnishing adjoining parts. Use them for *insulation shields* to prevent contact between the wiring and shafts of armatures; for *insulation sleeves* to slip over spliced wires; for *coil form* supports; and many other practical purposes.

We make an infinite variety of sizes (up to one-inch diameter), colors and coatings in open and closed end tubes with various degrees of wall thickness. Large production, specially designed machines, and forty years' experience enable us to serve you promptly and economically. Send coupon for free samples and practical suggestions.

MAIL THIS FOR FREE SAMPLES

STONE PAPER TUBE CO.
Washington, D. C.

Please send us free samples of Stone's Paper Tubes and list of helpful uses.

*Name of company*_____

*Address*_____

*City*_____ *State*_____

Gamewell Acquires Automatic Alarm Business

The Gamewell Company, Newton, Mass., is acquiring the business of the Rockwood Sprinkler Company, Boston. In March, 1929, the Gamewell Company took over the business of the Holtzer-Cabot Electric Company and the assets of the Harrington-Seaborg Corporation. The management states that the increased earnings from these acquisitions have exceeded predictions. For several years the Gamewell Company has been considering the acquisition of an automatic sprinkler business to round out its activities. The company specializes in an automatic burglar and fire alarm system.

Brevities

McLeod, Ward Company, has moved from 430 Eleventh Ave., New York City, to 521 West 45th St.

Nehring Electrical Works, DeKalb, Ill., announces through Paul A. Nehring, president, that contracts have been placed for complete equipment for the manufacture of bare copper wire and cable. The plant will have an annual capacity of 50,000,000 pounds.

Domestic Electric Company, Kent, Ohio, manufacturers of fractional horse power motors, desires all inquiries, etc., to be addressed to the aforementioned address, and not to its old one in Cleveland.

Master Electric Company, Dayton, Ohio, discontinued, on June 1, the manufacture of its entire split phase motor line. This action was taken in order to give central stations unqualified support in the enforcement of the recommendation of the Joint Committee on Fractional Horsepower Motors. The recommendation limits the starting current of all single phase motors operating on lighting circuits to 15 amperes and eliminates the use of the ordinary split phase type.

Altorfer Brothers Company, Peoria, Ill., established a new high in sales and earnings over a five-month period from January to May, 1930, according to O. A. Boheim, vice-president and general manager.

Hartford Time Switch Company, 73 Murray St., has consolidated with the Horolectrical Corporation, and will be located at 116 W. 114th St.

Fibre Company of Delaware, 400 W. Madison Ave., Chicago, has changed its name to The Delaware Hard Fibre Company.

Rutenber Electric Company, Marion, Ind., announces the acquisition as sales and advertising manager of William H. Sickinger, of Chicago.

Davis Regulator Company, Chicago, manufacturers of automatic valve specialties for oil, gas, water, air and steam flow and pressure control, has just completed a new factory at 2541 South Washtenau Ave. into which all departments have already been moved. Simultaneous with the announcement of the new address is that of the change of name from G. M. Davis Regulator Company to Davis Regulator Company.

Motor City Electric Company, formerly of 316 E. Jefferson Ave., Detroit, is now located at 1313 E. Congress St., Detroit.

Motorless D. C. Neon Sign Company, was cited in our June issue as having its office at 100 East 123d St., New York City. The correct address is 180 East 123d St.

Lotan Research Corporation, 6545 Euclid Ave., Cleveland, Ohio, is the successor by merger to the Lotan Products Company and the Gas Welding Service Company, both of Cleveland.

Turner Brass Works, Sycamore, Ill., has appointed R. S. Patten, general sales and advertising manager. His appointment inaugurates a new sales and advertising program, details of which will be made public at the annual convention of the Turner Sales organization, July 1 to 3.

A. A. Clark Company, Muskegon Heights, Mich., has just completed a new factory building in which it will manufacture vacuum cleaners and floor surfacing machines.

Tungsten Electric Corporation, Union City, N. J., has changed its name to Callite Products, Inc., and its address to 540 Gregory Ave., Union City.

Electric Refrigeration Department of the General Electric Company has announced the resignation of its advertising manager, L. R. Edwards effective since June 1. Mr. Edwards who had been with the company for the past three and a half years, will take a short vacation before reentering the advertising field.

Anaconda Wire & Cable Company, 25 Broadway, New York, subsidiary of the Anaconda Copper Mining Company, has purchased the California Wire and Cable Company, Orange and Oakland, Cal. The California company has been manufacturing weather-proof wires, cables, etc.

Ken-Rad Tube & Lamp Corporation recently announced that H. S. Dunning has been added to the staff in the capacity of quality engineer. Mr. Dunning comes direct from the Westinghouse Lamp Company with which he was associated for the past twenty years in various executive positions.

Porcelier Manufacturing Company, East Liverpool, Ohio, has changed the location of its main office to Greensburg, Pa.

Allen & Hills, Inc., Auburn, N. Y., announces an addition to its Auburn plant built to accommodate all operations under one roof, which were being carried on in rented space not adjacent to the main plant.

Clarostat Manufacturing Company, Inc., Brooklyn, N. Y., announces that all sales will hereafter be under the direct supervision of John J. Mucher, president. The former sales manager, Charles Golenpaul, is no longer connected with the firm.

Young Radiator Company, Racine, Wis., manufacturers of heat transfer units, announces, through F. M. Young, President, receipt of a large contract for Irving and Kari-Keen heating units entailing the manufacture of heater core and tank assemblies.

Spear Carbon Company, St. Mary's, Pa., offers a new line of brushes for use on mill type and hoist motors. The line includes grades suitable under all types of mill and hoist motors operating under varying conditions and all voltages of A.C. or D.C. current.

Hammond Clock Company, 2915 N. Western Ave., Chicago, wishes the foregoing address employed in all mail addressed to the company.

Ford Radio & Mica Corporation, 111 Bleecker St., New York City, has moved factory and office to 830 Fourth Ave., Brooklyn, N. Y.

United States Electric Motor Company, 3610 Superior Ave., Cleveland, Ohio, has bought out all assets of the Peter Electric and Repair Company.

Black & Decker Manufacturing Company, Baltimore, Md., has purchased the Cinderella Washing Machine Co., 4708 Chester Ave., Cleveland, Ohio.

Copeland Products, Inc., electric refrigeration manufacturers, had, during the month of May, a 135 per cent increase in unit orders as compared with May, 1929, according to President Louis Ruthenberg.

Reliance Manufacturing Company, Cleveland, Ohio, declared a regular quarterly dividend of $1 on common stock, payable July 1.

Cyclone Portable Electric Blower Company, formerly of 1304 Diamond St., Philadelphia, has settled itself in new quarters at 222 N. Twelfth St., Philadelphia.

Globe Metal Manufacturing Company has moved from 2122 Hazzard St., Philadelphia to Haggert & Emerald Streets in the same city. Its products are lighting fixtures and switch plates.

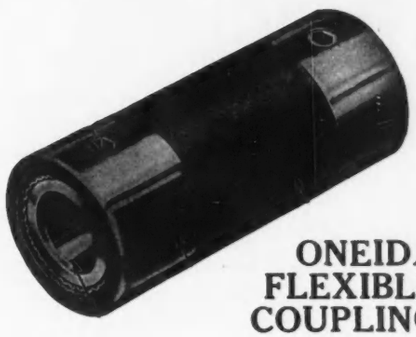
Trester Electric Service Company, 49 East Wells St., Milwaukee, Wis., manufacturers of air-cooled transformers, has changed its address to 69 Ogden Ave., Milwaukee.

Cooper Oven Thermometer Company, Pequabuck, Conn., has taken over the Horace R. Whittier Company of the same city. The firm will go under the Cooper name and will specialize in mechanical thermometers.

Oster Manufacturing Company and The Williams Tool Company, Cleveland, Ohio, recently merged, have announced that a legal formality forbids the changing or assumption of either one name. The name of the firm is The Oster Manufacturing Company and The Williams Tool Company. The combined products may be referred to as the Oster-Williams line.

Bowen Products Corporation, Auburn, N. Y., maker of lubricating products and the Bowen system of lubrication, is anxious to get in touch with any company that desires products manufactured. The firm is also looking for some new products to manufacture for themselves.

Absorbing the shocks of sudden starts and stops



ONEIDA FLEXIBLE COUPLING

Sudden starts and stops subject a motor to tremendous strain. The machine which this motor runs suffers the same shock. The ONEIDA Flexible Coupling overcomes wear and tear by absorbing these shocks, thereby lengthening the life of both motor and machine.

ONEIDA Flexible Couplings are made in many sizes to fit various motors. A sample of the size you require will be sent electrical manufacturers on request.

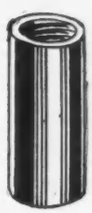
DELBEE RUBBER CO., *Syracuse, N. Y.*

INSULATING PAPERS FOR THE ELECTRICAL INDUSTRY

Red Rope Paper
Armature Paper
Imitation Pressboard
Cable Paper
Glassine

Made by
RIEGEL PAPER CORPORATION
342 Madison Ave. New York
MILLS IN NEW JERSEY AT RIEGELSVILLE AND MILFORD

. . . and there is no limit to what we can make from our fibre tubing



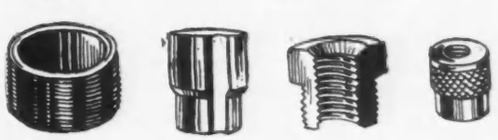
BRANDYWINE Fibre Parts are made from our fibre tubing into an infinite variety of shapes of practical value to electrical manufacturers.

The superior quality of material and workmanship in the fabrication of BRANDYWINE Fibre results in a better product.

Fibre tubing for your own use . .

We can ship, immediately, any quantity or size of fibre tubing in all mill lengths.

Booklet and prices will be sent to you on request.



Fibre BRANDYWINE

Brandywine Fibre Products Co.
1402 Walnut Street
Wilmington, Del.

Change Made in G. E. Sales Organization

Effective July 1, the industrial heating and welding section of the industrial department, General Electric Company, was divided into two sections. C. L. Ipsen is manager of sales of the industrial heating section, and L. D. Meeker is manager of sales of the electric welding section.

U. S. Army Places Large Order for Electric Ranges

The Quartermaster General of the United States Army has placed with the Westinghouse Electric & Manufacturing Company an order for 1950 electric ranges for installation in officers' quarters in the various army posts in the United States and its possessions.

Branch Offices and Agencies

Fullman Manufacturing Company, Latrobe, Pa., has appointed C. B. Moore, 1572 Rydalmount Road, Cleveland, Ohio, as sales representative for Ohio and northwestern Pennsylvania. The company manufactures floor boxes, fish wire, insulator supports and conduit benders.

Misener Manufacturing Company, Inc., Syracuse, N. Y., announces that R. J. DuBay has been appointed representative for the Pacific Coast territory, at 1040 Sutter St., San Francisco.

Harry W. Weinstein, 287 Washington St., Portland, Ore., wants to represent manufacturers on all electrical products requiring installation, such as conduits and electrical wiring devices. He says he covers the Pacific Northwest, Oregon and Washington.

William Porter, manufacturers' agent, formerly of 30 Church St., New York City, has taken new quarters at 1775 Broadway.

Mohawk Conduit Company, Inc., of Cohoes, N. Y., has placed E. T. Whitney in charge of its Chicago office in the Builders' Building, 228 North La Salle St. Mr. Whitney will assist the company's sales agents in the distribution of rigid conduit.

Lincoln Electric Company, Cleveland, Ohio, manufacturer of "Stable-Arc" welders and "Linc-Weld" motors, announces the removal of its Baltimore, Md., distribution office from 432 North Calvert to 600 North Calvert St.

R. L. Davis, engineer in charge of radio development at the East Pittsburgh plant of the Westinghouse Electric & Manufacturing Company, has been named manager of the Radio Engineering Department of the Westinghouse Chicopee Falls, Mass., plant. V. E. Truant has been appointed to the radio engineering position at East Pittsburgh made vacant by the transfer of Mr. Davis. As manager of the Chicopee Falls branch Mr. Davis will succeed H. J. Nichols, who resigned.

Dubilier Condenser Company, 342 Madison Avenue, New York, announces through N. S. Tobey, general sales manager, the appointment of two additional sales representatives. Congleton Engineering Company, 26½ North Ludlow Street, Dayton, Ohio, will cover southern Ohio and Kentucky, while Lombard Smith Company, 324 North San Pedro Street, Los Angeles, Cal., will cover California. Both sales representatives will handle radio manufacturing, jobbing, industrial and power factor sales in their respective territories.

Obituary

Albert J. Francis of Fort Wayne, Ind., manager of the fractional horsepower motor section of the industrial department of the General Electric Company, died June 17. Mr. Francis was born in Lyons, N. Y., Dec. 8, 1875. He was made manager of the fractional horsepower motor section on Jan. 1, 1916.

William J. Delles, executive engineer of the turbine engineering department of the General Electric Company, died at his home in Schenectady on May 22, following a sudden attack of heart disease. Mr. Delles was to have sailed the following week as a delegate to the World Power Conference meeting in Berlin. Graduated from the Mechanics Institute of Rochester, where he was born, Mr. Delles entered the employ of the General Electric Company in 1898.

For the Man Who Keeps Your Lists

Because the following manufacturers are now either out of business or have discontinued making an electrical product, we have removed their names from our lists:

General Elevator Company, 467 C St., N. W., Washington, D. C.

Pure Ozone Company, 1900 Euclid Bldg., Cleveland, Ohio.

DeLuxe Sign Sales Corporation, 966 Broad St., Newark, N. J.

Volk Mfg. Company, Bantam, Conn. (Fuses.)

Sun-O-Zone Products Company, 34 Euclid Ave., Cleveland, Ohio.

Firm Name or Address Changes:

Burke Controller Company, 369 Lexington Ave., New York City, taken over by Ward Electric Company, Mount Vernon, N. Y.

Eureka Metal Products Corporation, North East, Pa. Address changed to 2210 Elmwood Ave., Buffalo, N. Y.

Delco-Light Company, Dayton, Ohio. Address changed to Rochester, N. Y.

Wilkinsburg Manufacturing Company, 525 Penn Ave., Pittsburgh, Pa. Name and address changed to National Electric Corporation, 1810 Benedum-Trees Bldg., Pittsburgh.

The following manufacturers have been added to our lists either because they are new concerns or old companies which are now making some electrical product:

National Time and Signal Corp., 7755 Grand River Ave., Detroit, Mich.

Uniflow Mfg. Company, Erie, Pa.

Johnson Airplane and Supply Company, Dayton, Ohio.

McLewes Company, 688 Third Ave., New York City.

Holbrook, Merrill & Stetson, 903 North Main St., Los Angeles, Cal.

Bartlett Electric Company, 1130 S. Yorktown, Tulsa, Okla.

Nattatuck Mfg. Corporation, Waterbury, Conn.

Hauss Electric Company, 188 North St., Rochester, N. Y.

No-Draft Fan Fix Company, 1703 Builders Bldg., Chicago.

Manufacturers' Literature

ELECTRICAL MANUFACTURING *presents a digest of recently issued catalogs, bulletins and other advertising material. Manufacturers are invited to send literature for review in this column.*

Reynolds Electric Company, 2650 W. Congress St., Chicago, Ill.: Bulletin No. 200 showing Reco color accessories for boundary lights, obstruction lights, roof signs, hangar exterior lights, airway beacons and flood lights.

Wadsworth Electric Manufacturing Company, Inc., Covington, Ky.: Bulletin No. 43 describing and illustrating the Wadsworth flush type branch circuit cabinets for toggle switches.

Beardslee Chandelier Manufacturing Company, Chicago, Ill.: Bulletin No. 1 showing several designs of Gothic style lanterns, brackets and ceiling lights.

Cornish Wire Company, 30 Church St., New York City: New catalog describing a line of radio wires, antenna kits and lightning arresters. The company offers a complete line of hook-up wires for manufacturers.

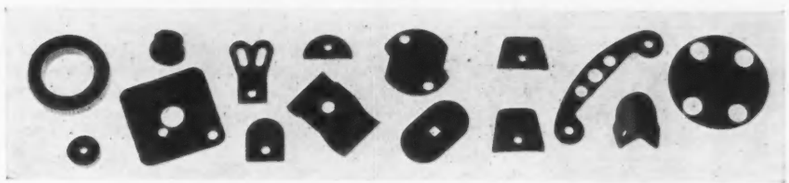
Callite Products Company, Union City, N. J.: Catalog, 48 pages describing the company's metallurgical products and alloys of tungsten, molybdenum and other refractory metals, including caltung, lead-in-wire and kromalloy.

Speer Carbon Company, St. Marys, Pa.: 55-page catalog "Speer Carbon Products" carrying a thorough discussion of brush characteristics, data on brush grades, information on installation, shunt specifications, data on standard terminals and shunt location specifications.

Burke Electric Company, Erie, Pa.: Bulletins H-1, H-3 and C.T.-4, comprising 200 pages in all describing high tension products including terminals, copper fittings, terminal blocks and Burkelect insulated bushings.

Rome Wire Company, division of General Cable Corporation, Rome, N. Y., offers a new bulletin descriptive of Romex non-metallic sheathed cable, its commercial applications and its reaction to tests.

Charles Engelhard, Inc., Newark, N. J.: Bulletin describing the Engelhard industrial instruments including pyrometers, indicators, thermo - elements, thermo - couple protecting tubes, switches, cold junction boxes, automatic temperature control, magnet valves, etc.



Fibre in odd shapes?

Yes, Wilmington Fibre makes these odd shaped pieces to the most exacting specifications of electrical manufacturers.

Our production capacity is 3,000,000 pieces daily, so you may be assured that we can produce any quantity ordered in a short space of time.

If you work your own fibre, we will supply you with fibre in rods, tubing and sheets in any quantity.

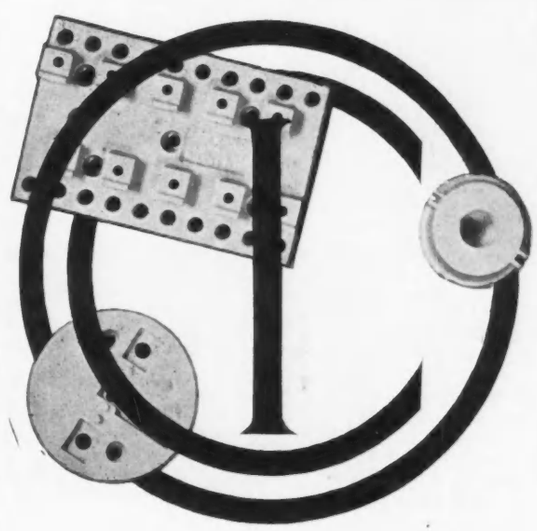
Write us about your fibre problems.

Get a sample
of
OHMOID
An approved laminated electrical insulation, having tremendous dielectric and crushing strength. Shock proof, non-deteriorating, and impervious to age, oil, grease and ordinary solvents. Test it yourself.

WILMINGTON FIBRE SPECIALTY CO.

Wilmington, Del.

World's Largest Manufacturers of Fibre Specialties



Colonial-*Quality*

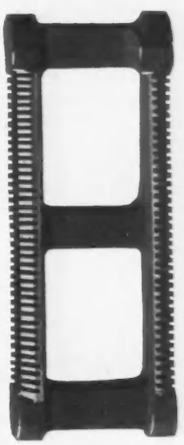
Special Electrical Porcelain and Refractory Porcelain

COLONIAL INSULATOR CO.

Established 1894

Akron, Ohio

LAVA
Insulators



The material lava possesses properties of vital importance in the adoption of insulating parts to be incorporated in electrically controlled machinery.

Lava possesses di-electric and mechanical strength, maintains accuracy of dimension and can be machined to special forms.

Though the design may be intricate, unusual facilities enable us to meet exacting specifications.

Write us for specific information.

AMERICAN LAVA CORPORATION

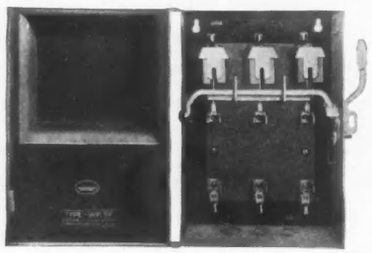
1425 William St. Chattanooga, Tennessee

Manufacturers of Heat Resistant Insulators

New Goods for Your Inspection

Safety Switches

Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa., offers a line of quick make and break Type C safety switches designed to afford a high degree of compactness without sacrifice of ample wiring room or sufficient voltage spacings. This line incorporates the De-ion arc quencher on the 575 volt sizes. The arc quenchers, consisting of nickel-plated, slotted steel plates held in place by insulating holders, are mounted individually over each jaw and are also easily removed from the front if it is desired to remove them for wiring. All copper parts of the switch are removable from the front of the base. The jaws and connectors are of one piece formed type, which decreases the number of clamped contacts and eliminates any possibility of heating from this source. Diamond pointed break jaws and extended blades assure clean contacts and prevent burning and beading of normal current carrying contact surfaces. The operating mechanism is actuated by a compression spring. In case of spring breakage, external operation of the switch is possible. The crank and all unpainted steel parts are cadmium plated. Crank bearings are dust-proof with grease packing. Knockouts are pressed back into the box to decrease the filtration of dirt and excessive moisture into the box. Bases are of Monson slate. Lock-on and lock-off brackets are provided.

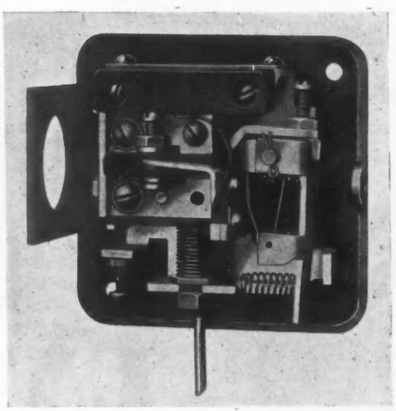


Hi-Duty Marker

Geo. T. Schmidt, Inc., 4102 Ravenswood Ave., Chicago, has introduced its Hi-Duty marker for stamping the details or fillins into name-plates, such as filling in volts, amperes, horsepower, and serial numbers on motor name-plates. The name-plate is placed on the machine to gauges, which may be set for various sizes. The dial is spun to the desired character and the operating lever makes the impression. As the operating lever is carried back to neutral position, the table moves forward one notch, similar to the action of a typewriter, and the dial is spun for the next character. The dial carries all the letters of the alphabet, figures, period, dash and fractional line. The machine may be had in 1/16, 3/32, and 1/8 in. characters. It weighs 38 lb.

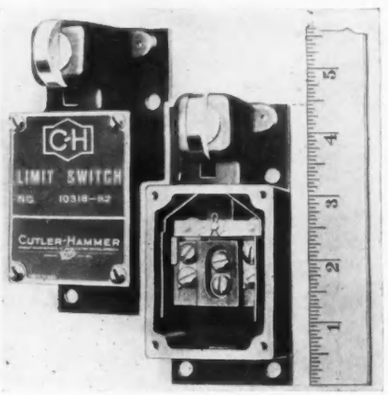
Industrial Heating Thermostat

General Electric Co., Schenectady, N.Y., announces its CR-2992-A-1 thermostat for use with industrial heating units where very close control of the heat is not required. This device is available in three ratings, and the operating ranges are (1) 60 to 200 deg. F.; (2) 150 to 300 deg. F.; and (3) 250 to 400 deg. F. The current carrying capacity is 15 amps. at 115 or 230 volts A. C., or ¼ amp. at the same voltages D. C. The thermostat will operate with a differential of 5 per cent of the maximum temperature range. The unit is mounted on a pressed-steel base which has two mounting holes and an upturned ear with an opening for a ¾-in. conduit. A drawn-shell cover, held in place by two screws, completes the inclosure of the switch. Cover and base are finished in black Duco. Clearances between all live parts and ground are in accordance with underwriters' specifications. All steel parts are cadmium plated to resist corrosion. Contacts are silver. The capillary tube consists of copper tubing of ⅛-in. outside diam., having the bellows sealed on the switch end and the bulb on the immersion end. Some suggested applications of the thermostat include wax pots on shoe machinery, laundry machinery, pressing and cleaning machinery, stills and sterilizers, vulcanizers, incubators and brooders, blue cookers, doughnut-cooking machines, match-making machines, water heaters, paper box machinery, oil burner equipments, embossing machinery and many process machines.



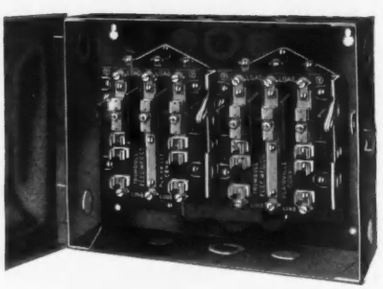
Small Limit Switch

Cutler-Hammer, Inc., 1315 St. Paul Ave., Milwaukee, Wis., offers a small, single-pole limit switch for general service. It can be applied on machine tools, conveyers, dough mixers, wash machines, and other small equipment, to start, stop or reverse the motor at its limits of travel. Two types are furnished: one with normally closed contacts, which are opened when the operating roller is depressed and the other with normally open contacts which are closed when the roller is depressed. This limit switch is compact. Double-break contacts are provided with silver-rivet contact tips. The movable contact is connected to the machined steel operating roller through a sliding shaft and a heavy Bakelite strip. A knock-out hole in the end of the cast-bronze inclosing case and accessible screw terminals facilitate wiring.



Magnetic Motor Reversing Switch

Trumbull Elec. Mfg. Co., Plainville, Conn., offers its No. 77321 line of magnetic motor reversing switches with remote control. This line consists of two standard magnetic switches mounted in one cabinet. Switches are interlocked mechanically, so that it is impossible for one switch to be thrown "on" until the other is "off." These switches are available for 115, 230, 460, and 575 volt service. They can be supplied either with or without relays. Polyphase switches are available in 5, 7½, 10 and 15 hp.; single phase switches in 3, 5, 7½ and 15 hp. for voltages of 115, 230, 460, and 575 respectively. The current rating of switches in this line is 30 amp. One surface type push-button station is included. Switches for use on 40 or 50 cycle service can be supplied.



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Write us for advice on your particular molding problems.

BOONTON RUBBER MFG. COMPANY

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Established 1891

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PROTECTION
that lasts
as long as
your product

If you make a product that should have the protective factors of FELT FEET, Brawley provides them with nail, wood or machine screw methods of attaching.

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T. R. BRAWLEY FELT CO., Inc.

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BAKELITE

for every electrical requirement

With our knowledge and moulding experience you may be assured that we can make the *special* piece exactly according to your specifications. We not only do the moulding but make the moulds. Every job is made under painstaking inspection.

KUHN & JACOB MACHINE & TOOL CO.

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Solid Soft Rubber Specialties

To shock-proof and insulate all manner of Electrical equipment. Send blue prints for prices and full particulars.

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The Toycraft Rubber Co., Ashland, Ohio

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ENAMELS
Clear Prismlac
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Decorative Finish
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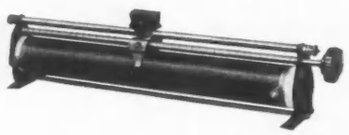
Chicago Office and Warehouse: 1115 W. Washington Blvd.
Los Angeles Office and Warehouse: 1214 Venice Blvd.
The border of this advertisement is a photographic reproduction of M & W Prismlac.

Tubular Rheostat

Hardwick, Hindle, Inc., 216 Emmett St., Newark, N. J., announces a tubular rheostat with a screw engagement mechanism so arranged that the act of grasping the



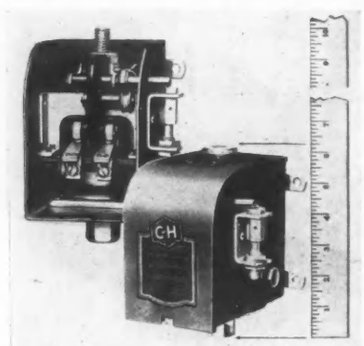
knob to adjust the slider by hand automatically disengages the screw engagement mechanism. This mechanism is self-supporting and self-aligning. The heavy phosphor bronze contact shoe maintains firm contact with the wire, but does not tear it. Due to the spring arrangement on the contact shoe, there is no current carried through it, which prevents it from overheating.

Resistors and Volume Controls

Polymet Mfg. Corp., 829 134th St., New York, has developed a line of carbon and wire-wound volume controls, including certain dual volume controls especially adapted for the radio set makers' use. Another development is a line of wire-wound tubular resistors which are treated with a heavy coating of Bakelite compound which will stand high temperatures as well as good mechanical protection. This line is rounded out by resistors of various types and improved tapped voltage dividers.

Small Pressure Regulator

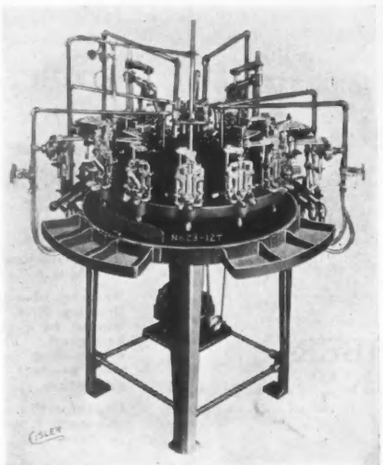
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis., has introduced a single pole pressure regulator measuring only a little over 6 in. in height. This device, designated as Bulletin 10006, can

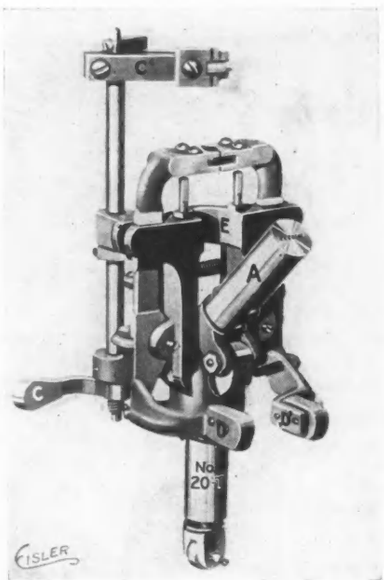


be used as a starting switch for motors up to 1 hp., 230 volts, A. C. or D. C., or as a pilot switch in the control circuit of automatic starters for larger motors. The regulator closes the circuit at low pressure and opens the circuit at high pressure. It can be adjusted to open the circuit at any pressure from 30 to 200 lb. It can be used for maintaining pressure on systems containing water, air, gas and other similar fluids. For air compressor service, a small unloader device at the side of the case removes back pressure. To withstand moist atmospheres, the inclosing case is black japanned and metal working parts are cadmium plated. Double-break silver contacts prevent pitting. Diaphragm is of rubber. There are ample conduit knockout holes in the case.

Automatic Stem Machine

Eisler Electric Corp., 770 S. 13th St., Newark, N. J., offers a 12-head automatic indexing, tipless stem machine for the use of radio tube and lamp manufacturers. This machine is equipped with a tilting

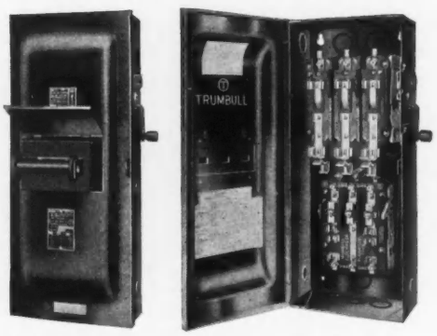




die block that operates as follows, referring to the accompanying detail illustration: By means of a track arrangement, roller *B* is pushed upward, tilting the die block *A* from its position *E*. Operator feeds flare into open jaws by pressing *D* and *D'*, then swings tipless holder arrangement by pressing *C* and placing exhaust tubing in *C'* holder. Tipless mechanisms of this machine open and close automatically. The machine is equipped with flexible gas and air connections. The machine occupies a space 5 ft. square and employs a ⅓-hp. motor.

Magnetic Motor Starting Switches

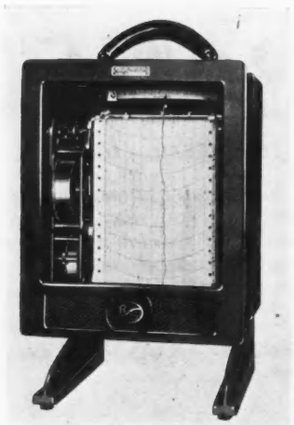
Trumbull Elec. Mfg. Co., Plainville, Conn., offers a line of switches which consists of a magnetic motor starting switch



and a disconnect switch mounted in one cabinet and furnished with test jacks for use with test plugs for testing power or current consumption of the circuit controlled without interrupting the motor circuit. This test jack type of switch is available in all combination switches manufactured by Trumbull Electric Mfg. Co.

Graphic Instruments

Roller-Smith Co., 233 Broadway, New York, announces its Types AG and DG graphic instruments made in switchboard, wall and portable models for direct and alternating current, and as ammeters, voltmeters, single and polyphase wattmeters and power factor meters. Standard models



cover ranges required for most graphic instrument measurements, but special ranges and types are available to meet practically any requirement. Among the features of this line of instruments pointed to by the manufacturer are: a rugged and dependable eight-day clock, a positive chart drive, easy accessibility of all parts, including the inkwell and pointer, light but rigid case, quick detachable cover, quick and easy means of inserting ink in the well and removing the pen, and magnetic damping. All graphic instruments are furnished with gears for five speeds, namely, ¾, 1½, 3, 6, and 12 in. per hour. They have the strip type of chart, 5 in. wide with 4½-in. scale. Chart is 75 ft. long. Average net weight of these instruments is 30 lb.

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THE AKRON PORCELAIN CO.
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Specialists in Porcelain

Porcelava

The best for Electric Heating Appliances

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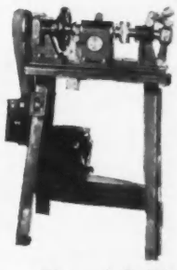
Burgess & Company
East Liverpool, Ohio
Factory at Wellsville, O.

Chicago Representative:
F. D. FARNAM & CO.
359 No. Wells St., Chicago, Ill.

New Winding Machine for Universal Use



Unusually strong and rigid, with powerful clutch, this machine winds coils of any number of turns, of large or small wire, and at any speed. Spindle is free to turn by hand when machine stops. Quick-acting chuck slides on parallels for variable center distances. Complete with change gear and automatic control of turns. Ball bearings throughout.

E. R. SEIFERT
Syracuse New York

Rapid Production Machines

DUNCO
RELAYS

We make a type of relay for every current control job wherein a relay plays a part. The new DUNCO CATALOG shows them all—it gives valuable engineering data, also.

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LOW WATER ABSORPTION
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CLEAN PUNCHING
MACHINEABILITY
IMPACT STRENGTH
APPEARANCE

SYNTHANE
CORPORATION OAKS-PENNA
NEW YORK, CHICAGO, CLEVELAND, SAN FRANCISCO
Sheets, Tubes, Rods, Fabricated Parts

Classified Index

MATERIALS, PARTS and EQUIPMENT

ON this and the following several pages is a monthly feature of ELECTRICAL MANUFACTURING, an alphabetically arranged classification of all materials, parts and equipment entering into the manufacture of the finished electrical product. Under each subject heading will be found the names of the manufacturers, local addresses and trade names of the products manufactured. Thus "Linolac" insulating varnish will be found in alphabetical position under the heading "Paint, Varnish, Lacquer."

A similar index of all finished electrical products for consumption or resale by wholesalers, contractors, contractor-dealers, central stations and industrial electricians, is a monthly feature of ELECTRICAL INSTALLATION RECORD.

ALLOYS, LIGHT METAL
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.

ALUMINUM
(Also Aluminum Bronze Powder.)
Albron, Alnoa, Alsmac. See Aluminum Co. of America.
Aluminum Co of America, 2444 Oliver Bldg., Pittsburgh.
Fairmont Aluminum Co., Fairmont, W. Va.

AMMETERS. See Instruments.

ARMATURE
Balancers. See Balancers, Armature.
Banding Machines. See Banding Machines, Armature
Bearings. See Bearings.
Buggies. See Lifts, Armature.
Coil Presses. See Presses, Armature Coil.
Coils. See Coils, Finished.
Core Punchings. See Discs, Armature.
Cranes. See Lifts, Armature.
Discs. See Discs, Armature.
Driers. See Ovens.
Growlers. See Testers, Coil.
Hoists. See Lifts, Armature.
Impregnators, Vacuum. See Ovens, Industrial.
Jacks. See Lifts, Armature.
Laminations. See Discs, Armature.
Lathes. See Lathes.
Lifts. See Lifts, Armature.
New. See Coils, Finished.
Notching Machines. See Notching Machines, Armature.
Pegs. See Pegs, Armature.
Pinion Pullers. See Pullers, Armature Shaft.
Repaired. See Repairing and Second-Hand.
Shaft Pullers. See Pullers, Armature Shaft.
Shaft Straighteners. See Straighteners, Armature Shaft.
Stands. See Stands, Armature.
Test Benches. See Test Benches, Armature.
Testers. See Testers, Coil; also Test Benches, Armature.
Torpedo Cord. See Twine, Armature Winding.
Trouble Shooters. See Testers, Coil; also Test Benches, Armature.
Trucks. See Lifts, Armature.
Wedges. See Pegs, Armature.
Winding Machines. See Winding Machines, Armature & Field Coil.
Winding Twine. See Twine, Armature.

ARMATURE & COIL SPRAY GUNS. See Spraying Outfits.

ARMORING MACHINES. See Wire Manufacturing Machines.

ARMS, FLEXIBLE. See Tubing Flexible Metallic.

ASBESTOS Shades. See Shades, Fabric.
Paper & Sheet. See Asbestos.
Slabs. See Asbestos Slabs.
Tape. See Tape, Asbestos.
Wire. See Wire, Insulated.
Yarn and Thread. See Yarn and Thread.

ASBESTOS
Sheet, Paper, Mill Board, Lumber.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
Easco. See Eastern Asbestos Co.
Eastern Asbestos Co., Providence, R. I.
Ferode & Asbestos, Inc., New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.

ASBESTOS SLABS
Slabs & Barriers for Switchboard.
Asbestos-Ebony. See Johns-Manville, Inc.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
Decelco, Inc., Wayne, Mich.
Electrobestos. See Johns-Manville Corp.
Ferode & Asbestos, Inc., New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.
Transite. See Johns-Manville, Inc
Zellite. See Decelco, Inc.

BAGS, Vacuum Cleaner
Merrimack Mfg. Co., Boston, Mass.

BAKELITE MOULDS. See Dies, Die Makers.

BALANCERS, Armature
(Dynamic Balancing Machines—Balancing Ways).
Armature Coil Equip. Co., 2415 Forestdale Ave., Cleveland, O. (Machine).
Bowsher Co., N. P., South Bend, Ind.
Olsen Lundgren. See Olsen Testing Machine Co.
Olsen Testing Machine Co., Tinius, 500 N. 12th St., Philadelphia, Pa. (Machines).
Sundstrand Machine Tool Co., Rockford, Ill.
Twentieth Century. See Sundstrand Machine Tool Co.
Vibration Specialty Co., 1534 Winter, Philadelphia, Pa. (Machines).

BALL BEARINGS. See Bearings, Ball and Roller.

BANDING MACHINES, Armature
Columbia Machine Wks. & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.
Sidion Company, Frank, Boston, Mass.

BARRIERS, Switchboard. See Slate; also Soapstone; also Asbestos.

BARS, BUS. See Brass, Bronze & Copper; also Aluminum.

BARS, Commutator
Anaconda. See American Brass Co.
American Brass Co., Waterbury, Conn.
Buckeye Tempered Copper & Brass Co., Mansfield, O.
Cameron Electric Mfg. Co., Ansonia, Conn.
Commutator Co., 121 N. Front, Minneapolis, Minn.
Electric Materials Co., North East, Pa.
Eureka Metal Products Corp., 2210 Elmwood Ave., Buffalo, N. Y.
Homer Commutator Co., 4748 Hough Ave., Cleveland.
Rome Brass & Copper Co., Div. of Revere Copper & Brass, Inc., Rome, N. Y.

BASES, Radio Tube. See Radio Molded Parts.

BASES, Reading Lamp
Metal, Pottery, Wood & Glass.

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Aladdin Mfg. Co., 602 E. 18th, Muncie, Ind.
Camar Pottery, Camden, Ark.
Estes & Sons, E. B., 5844 Grand Central Terminal, New
Fulper Pottery Co., Flemington, N. J.
Globe Metal Spinning Co., 178 Centre, New York, N. Y.
Hemill Products, Inc., 103 Mott, New York, N. Y.
Insulation Mfg. Co., New York Ave. and Herkimer St., Brooklyn, N. Y.
Marbleart. See Insulation Mfg. Co.
Natural. See Insulation Mfg. Co.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sneath Glass Co., Wabash Ave., Hartford City, Ind.
Van Briggle Tile & Pottery Co., Colorado Springs, Colo.
Weller, S. A., Zanesville, O. (Pottery.)
Yokel Corp., 319 Homestead Ave., Hartford, Conn.
Zane Pottery Co., South Zanesville, O.

BATTERY CHEMICALS. See Chemicals, Battery.
BATTERY CUT OUTS. See Switches, Battery.
BATTERY GAGES. See Instruments, Pocket.
BATTERY JARS. See Jars, Battery, Glass; also Rubber; also Molded Insulation.
BATTERY OXIDES. See Chemicals, Battery.
BATTERY SALTS. See Chemicals, Battery.
BEAD CHAIN. See Chain, Socket.
BEADS, Chandelier. See Crystals, Chandelier.

BEADS, Insulating
American Lava Corp., 1425 William, Chattanooga, Tenn.
Durco. See Struthers Dunn, Inc.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.

BEARINGS
Ball & Roller. See Bearings, Ball & Roller.
Graphite. See Bearings, Oil-less.
Oil-less. See Bearings, Oil-less.
Sleeve. See Bearings & Bushings.

BEARINGS, Ball and Roller
Aetna Ball Bearing Mfg. Co., Chicago, Ill.
Ahlberg Bearing Co., 312 E. 29th, Chicago, Ill.
American Roller Bearing Co., Pittsburgh, Pa.
Auburn Ball Bearings Co., 57 Clarissa, Rochester, N. Y.
Ball & Roller Bearing Co., Danbury, Conn.
Bantam Ball Bearing Co., South Bend, Ind.
Bearings Co. of America, Lancaster, Pa.
Commercial. See Schatz Mfg. Co.
C J B. See Ahlberg Bearing Co.
Fafnir Bearing Co., New Britain, Conn.
Federal Bearing Co., Poughkeepsie, N. Y.
Gurney. See Marlin-Rockwell Corp.
Gwilliam Co., 360 Furman, Brooklyn, N. Y.
Hoffman. See Norma-Hoffman Bearings Corp.
Hoover Steel Ball Co., Ann Arbor, Mich.
Hyatt Roller Bearing Div. of General Motors Corp., Harrison, N. J.
McGill Metal Co., Valparaiso, Ind.
Marlin-Rockwell Corp., Gurney Ball Bearing Div., Jamestown, N. Y.
Mathews Mfg. Co., 104 Gold, Worcester, Mass.
New Departure Mfg. Co., Bristol, Conn.
Nice Ball Bearing Co. (Nicestown), Philadelphia, Pa.
Norma-Hoffman Bearings Corp., Stamford, Conn.
Roller Bearing Co. of America, Whitehead Rd., Trenton.
Schatz Mfg. Co., Poughkeepsie, N. Y.
Schubert. See McGill Metal Co.
S R B. See Standard Steel & Bearings, Inc.
Standard Steel & &Bearings, Inc., Div. of Marlin-Rockwell Corp., Plainville, Conn.
Strom Bearings Co., 4587 Palmer, Chicago, Ill.
S. K. F. Industries, 40 E. 34th, New York, N. Y.
Timken Roller Bearing Co., Canton, O.
Torrington Co., Torrington, Conn.
Zubler Bearings Co., 1321 W. Tioga, Philadelphia, Pa.

BEARINGS, Oil-Less
Argute Oilless Bearings Co., 149 Berkeley, Philadelphia, Pa.
B. M. C. See Burlington Metal Corp.
Bogert & Hopper, Inc., 225 Varick, New York, N. Y.
Bound Brook Oil-less Bearing Co., Bound Brook, N. J.

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Ask for samples
STRUTHERS DUNN, INC.
134 North Juniper Street, Philadelphia, Pa.

Burlington Metal Corp., Burlington, Wis.
Cleveland Graphite Bronze Co., 880 E. 72nd, Cleveland, O.
Electric Railway Equipment Co., 30 Church, New York, N. Y.
Elreco. See Electric Railway Equipment Co.
Graphalloy. See Graphite Metallizing Co.
Graphite Metallizing Co., 1050 Nepperhan Ave., Yonkers, N. Y.
Lubrite. See Merriam Bros., Yonkers, N. Y.
Merriam Bros., 185 Amory, Boston, Mass.
Metal Saw & Machine Co., Springfield, Mass.
Moraine Products Co., First & Foundry Sts., Dayton, O.
Neveroil Bearing Co., Wakefield, Mass.
Nolu Oilless Bearing Co., 2 E. Johnson (Germantown), Philadelphia, Pa.
O. & S. Bearing Co., 315 S. Artillery, Detroit, Mich.
Reliance. See Metal Saw & Machine Co.
Selb Lignum-Vitae Woodturning Co., 93 Boyd Ave., Jersey City, N. J.
United States Graphite Co., Saginaw, Mich.

BEARINGS AND BUSHINGS
(For Armature Shafts.)
Ajax Metal Co., Philadelphia, Pa.
American Bronze Corp., Berwyn, Pa.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bunting Brass & Bronze Co., Toledo, Ohio.
Cadman Mfg. Co., G. W., Pittsburgh, Pa.
Damascus Bronze Co., Pittsburgh, Pa.
Durex. See Moraine Products Co.
Erie Bronze Co., 1832 Chestnut, Erie, Pa.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit, Mich.
Flood City Mfg. Co., Johnstown, Pa.
Johnson Bronze Co., New Castle, Pa.
Lumen Bearing Co., Buffalo, N. Y.
Moraine Products Co., First & Foundry Sts., Dayton, O.
United States Graphite Co., Saginaw, Mich.

BELTING, Chain Transmission. See Chain, Power Transmission.

BELTS, Rubber
Molded Cord Rubber Belts for Electrical Appliances.
Dayton Rubber Mfg. Co., Dayton, O.
Fay Rubber Products Co., Elyria, O.
Gilmer Co., L. H., Cottman & Keystone Sts. (Tacony), Philadelphia, Pa.
Todd Elect. Co., 914 Grand Ave., Kansas City, Mo.

BENDERS, Coil Loop
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Segur. See Electric Service Supplies Co.

BENDING. See Punching & Bending.
BINDING POSTS. See Posts, Binding.

BLADES, Fan
Estes & Sons, E. B., 5844 Grand Central Terminal Bldg. New York, N. Y.
Reading Elec. Co., Inc., 24 Frankfort, New York, N. Y.
Torrington Mfg. Co., Torrington, Conn.

BLOCKS, Terminal. See Terminal Blocks.

BLOWERS, Armature
For Dusting Out Motors.
Big Midget. See Sturtevant Co.
Breuer Elec. Mfg. Co., 852 Blackhawk, Chicago, Ill.
Clements Mfg. Co., 609 Fulton, Chicago, Ill.
Cyclone Portable Electric Blower Co., 1304 Diamond, Philadelphia, Pa.
Electric Blower Co., 352 Atlantic Ave., Boston 9, Mass.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Marvel. See Electric Blower Co.
Sanitator. See United Elec. Co.
Cadillac. See Clements Mfg. Co.
Standard Elecl. Tool Co., 1939 W. Eighth, Cincinnati, O.
Sturtevant Co., B. F. (Hyde Park), Boston, Mass.
Tornado. See Breuer Elec. Mfg. Co.
United Elec. Co., 1230 8th, Conton, O.
United States Elecl. Tool Co., 2488 W. Sixth, Cincinnati, O.

BLUESTONE. See Chemicals, Battery.
BOARD, Fuller. See Cloth and Paper.
BOARD, Press. See Cloth and Paper.
BOMBARDING MACHINES. See Machines, Lamp Making
BOWL HOLDERS. See Fixture Fittings.
BOX & CABINET BUSHINGS. See Bushings, Box & Cabinet.

BOX BOARD
Container Corp. of America, 111 W. Washington, Chicago

BOXES, Fibre
Contalner Corp. of America, 111 W. Washington, Chicago
BOXES, Sheet Steel. See Cabinets, Sheet Steel.
BOXES, Wood. See Cabinets & Boxes, Wood.

BOXES AND WRAPPERS
Brown & Bailey Co., 417 N. Eighth, Philadelphia, Pa.
Bulldog. See Pittsburgh Corrugated Paper Box Co.
Campbell Paper Box Co., 904 S. Main, South Bend, Ind.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, 111 W. Washington, Chicago
Gair Co., Robert, 420 Lexington Ave., New York. (Boxes)
Gator-Hide Kraft. See International Paper Co.
Hinde & Dauch Paper Co., 325 Decatur, Sandusky, Ohio.
Huntington Paper Box Co., Huntington, Ind.
International Paper Co., 100 E. 42nd, New York, N. Y.
Lake Lithographing Co., 2570 Superior Ave., Cleveland, O. (Display Cartons.)
National Folding Box Co., New Haven, Conn. (Cartons)
Pequot Mfg. Corp., Glendale (L. I.), New York.
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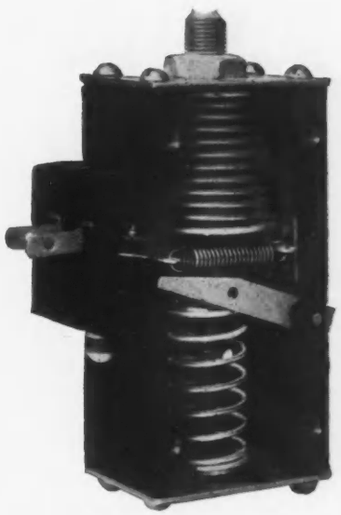

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Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Buffalo Bronze Die Cast Corp., 100 Arthur, Buffalo, N. Y.
Dallas Brass & Copper Co., Div. of Revere Copper & Brass, Inc., 820 Orleans, Chicago, Ill.
Durbar. See Buffalo Bronze Die Cast Corp.
Electric Materials Co., North East, Pa.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit, Fredericksen Co., Saginaw, Mich.
Higgins Brass & Mfg. Co., Div. of Revere Copper & Brass, Inc., 12435 Dequindre, Detroit, Mich.
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Michigan Copper Brass Co., Div. of Revere Copper & Brass, Inc., 5851 W. Jefferson Ave., Detroit, Mich.
Nickeloid. See American Nickeloid Co.
Plume & Atwood Mfg. Co., 474 Bank, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Sobeco. See Fredericksen Co.
Seymour Mfg. Co., Seymour, Conn.
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Titan Metal Mfg. Co., Bellefonte, Pa. (Rods and Forgings.)
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BREAKERS, Circuit. See Circuit Breakers.

BRIDGES, Wheatstone. See Instruments, Laboratory Standard.

BRONZE. See Brass, Bronze and Copper; also Castings.

BRONZE, Phosphor. See Phosphor Bronze.

BRONZE POWDER, Aluminum. See Aluminum.

BRUSH HOLDERS. See Brushes, Commutator.

BRUSHES, Carbon. See Brushes, Commutator.
Graphite. See Brushes, Commutator.
Metal Graphite. See Brushes, Commutator.

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(Brushes, Brush Holders and Flexible Leads.)
Brush Holders ..... See H
Carbon, Graphite, Metal Graphite ..... See C
Flexible Leads and Pig Tails ..... See L
Sheet Metal ..... See H
Wire Gauze ..... See W

Automotive Mfg. Co., Kansas City, Mo.							H
B. B. B. See Becker Bros. Elec'l Corp.							
Baylis Co., Bloomfield, N. J.							H
Becker Bros. Elec. Corp., 23 N. Jefferson, Chicago, Ill.				C	W	S	H L
Blanck & Carrier Corp., 115 W. 63rd, New York, N. Y.				C			
Boxill-Bruel Carbon Co., Columbia, O.				C			H
Calebaugh Self-Lubricating Carbon Co., 1503 Columbia Ave., Philadelphia, Pa.				C			
Carbon Engrg. Co., Slinger, Wis.				C			L
Carbon Laboratories Co., 5005 Euclid Ave., Cleveland, O.				C			
Carbon & Graphite Corp., 227 West Broadway, New York, N. Y.				C			
Carenco. See Carbon Engineering Co.							
Chapin Co., Chas. E., 227 Fulton St., New York, N. Y.				C	W	S	L
Columbia Machine Wks., & M. I. Co., 263 Chestnut, Brooklyn, N. Y.							H
Cooley Mfg. Co., 98 Park Place, New York					W		
Diamond C. See Chapin Co., Chas. E.							
Dixon Crucible Co., Monmouth St., Jersey City				C			
Electra. See Automotive Mfg. Co.							
Electric Accessories Co., 310 York Ave., Philadelphia, Pa.							H
Electro-Nite Carbon Co., 306 N. Fourth, Philadelphia, Pa.				C			
Eureka Metal Products Corp., 2310 Elmwood Ave., Buffalo, N. Y.					W	S	H
Fleck Carbon Co., 508 Broome, New York				C			
General Electric Co., Schenectady, N. Y.				C			H
Graphalloy. See Graphite Metalizing Corp.							
Graphite Metalizing Corp., 1050 Nepperhan Ave., Yonkers, N. Y.				C			H
Henrite Products Co., 98 Park Place, New York, N. Y.				C			
Holland Trolley Supply Co., 1623 E. 43rd. Cleveland, Ohio							H
Keystone Carbon Co., 4630 N. 11th, Philadelphia, Pa.				C			
Kohlenite Products Co., 92-34 152nd St., Jamaica, N. Y.				C			
Le Carbone Co., 15th St., Hoboken, N. J.				C			
Le Valley Vitax Carbon Brush Co., 4851 Grand Central Terminal, New York, N. Y.				C			
Marks Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich.				C			
Morganite Brush Co., 33-03 48th Ave., Long Island City, N. Y.				C			
National Carbon Co., Cleveland, O.				C			
New Process Carbon Co., 1503 Columbia Ave., Philadelphia, Pa.				C			L
No Spark. See Calebaugh Self-Lubricating.							
Ohio Carbon Co., 12508 Almira Ave., Cleveland, Ohio				C	W		L
Ohio Elec. Specialty Mfg. Co., Troy, O.					W		
Perfection Supply Co., 98 Park Pl., New York, N. Y.				C	W	S	H L

Pittsburgh Carbon Brush Co., 801 Fulton, Pittsburgh, Pa.				C			
Pure Carbon Co., Wellsville, N. Y.				C	W	S	L
Pyramid. See National Carbon Co.							
Reaction. See Baylis Co.							
Reading Elec. Co., Inc., 24 Frankfort, New York, N. Y.				C			L
Rome Wire Co., Div. of General Cable Corp., Rome, N. Y.					W		L
Salem Electrical Supply Co., 285½ Bridge, Salem, Mass.					W		
Smarr & Co., Geo. W., 110 S. Ninth, St. Louis, Mo.				C			
Speer Carbon Co., St. Mary's, Pa.				C			
Stackpole Carbon Co., St. Mary's, Pa.				C			
Sterling. See Carbon Laboratories Co.							
Superior Carbon Products Co., North Rd., Poughkeepsie, N. Y.				C			
U. S. Graphite Co., Saginaw, Mich.				C			
Universal. See Graphite Metalizing Corp.							
Weber Elec. Wks., Brooklyn Sta., Cleveland.				C			L

BRUSHES, PNEUMATIC SPRAYING. See Spraying Outfits.

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Omaha Brush Co., 320 N. 15th, Omaha, Neb. (Brushes rebristled.)
Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio.

BUGGIES, Armature. See Lifts, Armature.

BULBS, Glass
For Incandescent Lamps and Tubes.
Almo Mfg. Co., 38 Crawford, Newark, N. J.
Corning Glass Wks., Corning, N. Y.
Fayette Glass Bulb Co., 229 21st, Brooklyn, N. Y.

BUNCHING MACHINES. See Wire Manufacturing Machines.

BUS BAR. See Brass, Bronze and Copper. Also Aluminum.

BUSHINGS, SHAFT. See Bearings and Bushings.

BUSHINGS, Box and Cabinet, Porcelain
Appleton Electric Co., 1703 Wellington Ave., Chicago, Ill.
Columbia Metal Box Co., 226 E. 144th St., New York, N. Y.
Harter. See Multi Elecl. Mfg. Co.
Knox Porcelain Corp., Knoxville, Tenn.
Minerallac Electric Co., 1045 Washington Blvd., Chicago, Ill.
Multi Electric Mfg. Co., 1840 W. 14th Ave., Chicago, Ill.
Nelson Elec. Co., Plant City, Fla.

CABINET GRILL CLOTH. See Cloth, Untreated.

CABINETS, Fibre
Continental-Diamond Fibre Co., Newark, Del.
Vulcanwood. See Continental-Diamond Fibre Co.

CABINETS, Refrigerator. See Refrigerator Cabinets.

CABINETS, Sheet Steel
Stamped and Turned-up Boxes and Cabinets.
Acme Blow Pipe & Sheet Metal Wks., 713 Magazine, New Orleans, La.
Adam Electric Co., Frank, St. Louis, Mo.
All-Steel-Equip. Co., Aurora, Ill.
American Metal Wks., 4865 Stenton Ave., Philadelphia, Pa.
American Steel Furniture Co., 27 W. 24th, New York, N. Y.
Artisan Sheet Metal Corp., 53 Gorham, Rochester, N. Y.
Benjamin Elec. Co., W. A., 1378 E. 16th, Los Angeles, Cal.
Berks Engineering Co., Reading, Pa.
Berthold Elec. Co., Gus, 551 W. Monroe, Chicago, Ill.
Bonnell Elec. Mfg. Co., 102 Chambers, New York, N. Y.
Chicago Hdwe. Foundry Co., North Chicago, Ill.
C. & P. Electric Wks., Springfield, Mass.
Coast Specialty Co., 73 E. Sixth, Portland, Ore.
Cole Electric Products Co., 33 Crescent, Long Island City.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbia Elec. Mfg. Co., 59 Columbus Sq., San Francisco, Cal.
Columbia Metal Box Co., 226 E. 144th, New York, N. Y.
Columbian Steel Tank Co., 1505 W. 12th, Kansas City, Mo.
Commercial Mfg. & Supply Co., 1443 Delaware St., Denver.
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Dowman-Dozier Mfg. Co., 1314 Murphy Ave., S. W., Atlanta, Ga.
Electric Apparatus Co., 704 N. Halsted, Chicago, Ill.
Electric Panelboard Co., 426 Exchange, Rochester, N. Y.
Federal Steel Products Co., 2 Ave. L, Newark, N. J. (Polarized Boxes.)
Fouch Elec. Mfg. Co., 105 N. Ninth, Portland, Ore.
Greater New York Metal Box Co., Inc., 143 W. 19th, New York.
Gurney Sheet Metal Wks., 718 E. 4th, Long Beach, Cal.
Holzer Sheet Metal Wks., Inc., 317 Burgandy, New Orleans, La.
Isert Co., J. H., 1234 Rowan, Louisville, Ky.
Karp Metal Products Co., 129 30th, Brooklyn, N. Y.
Large-Dail Mfg. Co., 311 N. Tenth, Philadelphia.
Lexington Elec. Products Co., 12 Chapel, Newark, N. J.
Lorentzen, H. K., 155 Leonard, New York, N. Y.
MacMillen Mfg. Co., 1400 N. Spring, Los Angeles, Cal.
Mansfield Elec. Hardware Co., Longview Ave., Mansfield, O.
Metropolitan Elec. Co., 2914 First Ave., S., Seattle, Wash.
Metropolitan Elec. Products Co., Blvd. at 14th, Long Island City, N. Y.
Milwaukee Vault & Cabinet Co., 521 Market, Milwaukee.
Mosher, S. L., 1951 Lawrence, Denver, Colo.
National Metal Box Co., Van Dyke & Ferris Sts., Brooklyn.
Newman Elec. & Mfg. Co., Eau Claire, Wis.
Par-Metal Products Corp., 3519 41st, Long Island City, N. Y.
Penn Electrical Co., 35 Water, Irwin, Pa.
Powerlite Switchboard Co., 4149 E. 79th, Cleveland, O.
Rezioh. See Holzer Sheet Metal Works.
Robbins & Myers Sales, Inc., Springfield, O.
Security. See Aurora Steel Products Co.
Standard Metal Box Corp., 950 Grand St., Brooklyn, N. Y.
Star Metal Box Co., 238 46th, Brooklyn, N. Y.
Superior Switchboard & Devices Co., 420 Schroyer Ave., Canton, O.
Tanner & Co., Wm. F., 511 S. Sharp, Baltimore, Md.
United Metal Box Co., 473 President, Brooklyn, N. Y.
United Sheet Metal Wks., 575 Howard, San Francisco.
Universal Metal Box & Products Co., 316 Colt, Irvington, N. J.
Wadsworth Elec. Mfg. Co., Covington, Ky.
Wiegman & Co., E. M., 1908 Benton, St. Louis, Mo.
Wurdack Elec. Mfg. Co., 4444 Clayton Ave., St. Louis, Mo.

CABINETS AND BOXES, Wood
Accurate Molding Corp., 20 Morton, Brooklyn, N. Y.
Adler Mfg. Co., Louisville, Ky.
Adler Royal. See Adler Mfg. Co.
Ampere. See Donehue Lumber Co.
Art Woodworking Co., Inc., 1035 Seattle Blvd., Seattle.
Boehm Cabinet Co., J., 2216 W. 63rd St., Cleveland, O.
Carlon. See Art Woodworking Co.
Carolina Wood Products Co., Asheville, N. C.
Carrom Co., Ludington, Mich.
Caswell-Runyon Co., Huntington, Ind.
Cary Cabinet Corp., 1427 N. 15th, St. Louis, Mo.
Cheney Piano Action Co., A. C., Castleton, N. Y.
Chickasaw Furniture Mfg. Co., Memphis, Tenn.
Conrades Mfg. Co., 1942 N. Second, St. Louis, Mo.
Conner Furniture Co., New Albany, Ind.
Continental Radio Corp., East Pontiac, Extended, Fort Wayne, Ind.
Corbett Cabinet Mfg. Co., St. Mary's, Pa.
Cory Cabinet Corp., Springfield, Mo.
Derker Co., Geo., Henderson, Ky.
Ebert Furniture Co., 225 W. 34th, New York, N. Y.
Elkin & Sons, Frederick, 44 Central Ave., Brooklyn, N. Y.
Empire-United Hat Block Co., 312 E. 22nd, New York.
Estes & Sons, E. B., 5844 Grand Central Terminal Bldg., New York, N. Y.
Excello Products Corp., 4836 W. 16th, Cicero, Ill.
Federal Wood Products Corp., 206 Lexington Ave., New York, N. Y.
Grand Rapids Furniture Co., Grand Rapids, Mich.
Harper Mfg. Co., Canopolis, Mich.
Hickory Box Co., Hickory, N. C.
Hubbell, H. L., 59 Market Ave., N. W., Grand Rapids.
Interstate Woodworking Co., 46 Wooster, New York, N. Y.
Karpen. See Studner Bros.
King Mfg. Corp., 254 Rano, Buffalo, N. Y.
Klumpp Sons, John G., 13 Baxter, New York, N. Y.
Knoxville Table & Chair Co., Knoxville, Tenn.
National Cabinet Co., New Philadelphia, O.
New England Box Co., Greenfield, Mass.
Ohio Valley Cabinet Co., Wheeling (Warwood), W. Va.
Oneida Cabinet Corp., Oneida, N. Y.
Ottawa Furniture Co., Holland, Mich.
Phono-End-Table. See Continental Radio Corp.
Pooley Co., 16th & Indiana Ave., Philadelphia, Pa.
Radio Cabinet & Equipment Co., 1504 Vine, Philadelphia
Radio Mfg. Co., Div. of Pilliod Lumber Co., Swanton, O.
Radio Master Corp., Bay City, Mich.
Red Lion Cabinet Co., Red Lion, Pa.
R E. Z. Cabinet Co., 54 North, Boston, Mass.
Schutz Bros., 152 Chambers, New York, N. Y.
Showers Bros. Co., Bloomington, Ind.
Signal Elec. Mfg. Co., Menominee, Mich.
Southern Toy Co., Hickory, N. C.
Specialty Display Case Co., Kendallville, Ind.
Starr Piano Co., Richmond, Ind.
Stettner Phonograph Corp., 669 Kent Ave., Brooklyn, N. Y.
Studner Bros., 67 W. 44th, New York, N. Y.
Superior Cabinet Corp., 206 Broadway, New York, N. Y.
Syracuse Screen & Grille Co., North Manchester, Ind.
Tessler Bros., 355 Bridge, Northampton, Mass. (Radio.)
Trenton Wood Specialty Co., Stokes Ave. and P. R. R., Trenton, N. J.
Udell Wks., 28th and Barnes Ave., Indianapolis, Ind.
Watsontown Table & Furniture Co., Watsontown, Pa.
West Box Co., 235 Liberty, Springfield, Mass.
Wood Cabinet Corp., 196 Lexington Ave., New York, N. Y.

CABLE ARMORING MACHINES. See Wire Manufacturing Machines.

CABLE TEST SETS. See Instruments, Portable and Switchboard.

CABLING MACHINES. See Wire Manufacturing Machines.

CANDLES, Fixture
Glass, Fibre Paper.
Brandywine Fibre Products Co., 1402 Walnut, Wilmington.
Cleveland Container Co., 10619 Berea Rd., Cleveland, O.
Fibre Products Co., New Bedford, Mass.
Franklin Fibre Specialty Co., 173 Lafayette, New York, N.Y.
Phoenix Glass Co., Monaca, Pa.
Remington Mfg. Co., 939 Barnum Ave., Bridgeport, Conn.
Seamless. See Fibre Products Co.
Universal Brass Wks., 209 Vine, Philadelphia, Pa.

CANOPY (Canopies). See Fixture Fittings.
Insulators. See Insulators.
Switches. See Switches, Snap.

CAPACITORS, RADIO. See Radio Circuit Components.

CARBON, Powdered
Marks Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich.

CARBONS, Battery. See Carbons.
Arc Light. See Carbons.

CARBONS
Battery Arc Light.
Becker Bros. Elecl. Corp., 23 N. Jefferson, Chicago, Ill.
Blanck & Carrier Corp., 115 W. 63rd, New York, N. Y.
Columbia. See National Carbon Co.
Daylight. See National Carbon Co.
Lessing. See Blanck & Carrier Corp.
Nuernberg. See Blanck & Carrier Corp.
National Carbon Co., Cleveland, Ohio.
Oretip. See National Carbon Co.
Speer Carbon Co., St. Mary's, Pa.
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CASES, Eliminator. See Cases, Eliminator.
Flashlight. See Cases, Flashlight.

CASES, Eliminator
Brumberger Co., 252 Pearl, New York, N. Y.
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Luna Metal Products Co., 38 Emerson Pl., Brooklyn, N. Y.

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CASTINGS, Aluminum. See Castings, Aluminum Alloy.
Castings, Copper, etc.
Brass. See Castings.
Bronze. See Castings.
Copper. See Castings.
Die. See Castings, Die.
Monel Metal. See Castings.
Steel. See Castings, Steel.
White Metal. See Castings.

CASTINGS, Aluminum

American Aluminum Ware, 368 Jeliff Ave., Newark, N. J.
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
Bergen Point Brass Foundry, Sixth & Ave A, Bayonne, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bohn Aluminum & Brass Corp., 2513 E. Grand Blvd., Detroit, Mich.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Dick Bros., Inc., Reading, Pa.
Eureka Metal Products Corp., 2210 Elmwood Ave., Buffalo, N. Y.
Fairmont Aluminum Co., Fairmont, W. Va.
Monarch Aluminum Ware Co., 9301 Detroit Ave., Cleveland.
National Bronze & Aluminum Foundry Co., 88th & Lazy Cleveland, O.
Quality Aluminum Casting Co., Waukesha, Wis.
Sterling Die Casting Co., 749 39th, Brooklyn, N. Y.
Tenual. See National Bronze & Aluminum Foundry Co.
United Metal Mfg. Co., Inc., 25 Shipping, Norwich, Conn.
Veco Mfg. Co., South Norwalk, Conn.

CASTINGS, Die

Alemite Die-Casting & Mfg. Co., Woodstock, Ill.
Allied Die-Casting Corp., Long Island City, N. Y.
Alumac. See Aluminum Co. of America.
Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
American Brass Co., Waterbury, Conn.
Anaconda. See American Brass Co.
American Die Casting Co., 2040 Dominick, Chicago, Ill.
Badger Die Casting Co., 155 Buffalo, Milwaukee, Wis.
Barnhardt Bros. & Spindler, Monroe & Throop St., Chicago.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bohnalite. See Bohn Aluminum & Brass Corp.
Do-Di. See Doehler Die Casting Co.
Doehler Die Casting Co., 386 Fourth Ave., New York, N. Y.
Franklin Die Casting Corp., 826 Gifford, Syracuse, N. Y.
Illinois Die Castings Co., 551 W. Congress, Chicago, Ill.
Krome-Seebek Die Casting & Mfg. Co., 2935 W. 47th, Chicago, Ill.
Milwaukee Die Casting Co., 289 Fourth, Milwaukee, Wis.
National Die Casting Co., 600 N. Albany Ave., Chicago.
Newton Die Casting Corp., 146 Munson, New Haven, Conn.
Paragon Die Casting Co., 2701 N. Crawford Ave., Chicago.
Parker White Metal & Machine Co., Erie, Pa.
Permite. See Aluminum Industries, Inc.
Phoenix Die Castings Co., 21 Illinois, Buffalo, N. Y.
Pittsburgh Die Casting Co., 7508 Ardmore, Swissvale, Pa.
Precision Die Casting Corp., Syracuse, N. Y.
Republic Die Casting Co., 128 Mott, New York, N. Y.
Stewart Die Casting Co., 4500 Fullerton Ave., Chicago, Ill.
Superior Die Casting Co., 875 E. 70th, Cleveland, Ohio.
Twin City Die Castings Co., Talmadge and 33rd Aves., S. E., Minneapolis, Minn. (White Metal).

CASTINGS, Gray iron

American Engineering Co., Philadelphia, Pa.
Athens Foundry Co., Athens, Pa.
Barlow Foundry Co., 551 N. J. R. R. Ave., Newark, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Bridgeport Castings Co., 250 North Ave., Bridgeport, Conn.
Chicago Hardware Foundry Co., North Chicago, Ill.
Dick Bros., Inc., Reading, Pa.
Fairmount Foundry, Inc., Third & Westmoreland Sts., Philadelphia, Pa.
Farquhar Co., Ltd., A. B., York, Pa.
Forest City-Walworth Run Fuondries Co., 2500 W. 27th, Cleveland, O.
Gray Iron Foundry Co., Reading, Pa.
Laytham & Son Co., Wm. P., 889 Market, Paterson, N. J.
Milwaukee Grey Iron Foundry Co., 3910 Mitchell, Milwaukee, Wis.
North Lebanon Foundry Co., Second & Canal, Lebanon, Pa.
North Wales Mach. Foundry Co., North Wales, Pa.
Products Machine Co., Bridgeport, Conn.
Sacks Iron Foundry, L., 357 Wilson Ave., Newark, N. J.
Sharples Separator Co., Biddle & Patten Ave., Westchester, Pa.
Snead & Co., Pine St., Jersey City, N. J.
Union Mfg. Co., New Britain, Conn.
Western Foundry Co., Kedzie Ave. at 36th, Chicago, Ill.

CASTINGS, Malleable Iron

Western Malleable Iron Co., Naugatuck, Conn.
St. Louis Malleable Castings Co., 7701 N. Conduit Ave., St. Louis, Mo.

CASTINGS, Non-Ferrous

Copper, Brass, Bronze, Monel Metal, White Metal.
Anderson Mfg. Co., Albert & J. M., 289 A Boston, Mass.
American Manganese Bronze Co., Holmesburg, Philadelphia.
Atlas Brass Foundry Co., Columbus, O.
Barnard Foundry Co., 9 Roseland, Springfield, Mass.
Bergen Point Brass Foundry, Sixth & Ave A, Bayonne, N. J.
Berks Foundry & Mfg. Co., West Hamberg, Pa.
Bohn Aluminum & Brass Corp., 2512 E. Grand Blvd., Detroit, Mich.
Bonnell Elec. Mfg. Co., 192 Chambers, New York, N. Y.
Buffalo Bronze Die Cast Corp., 100 Arthur, Buffalo, N. Y.
Bridgeport Castings Co., 250 North Ave., Bridgeport, Conn.
Cadman Mfg. Co., A. W., Pittsburgh, Pa.
Central Pattern & Foundry Co., 3737 S. Sacramento Ave., Chicago, Ill.
Chase Brass & Copper Co., Waterbury, Conn.
Chicago Hardware Foundry Co., North Chicago, Ill.
Creamer & Co., W. G., 572 Smith, Brooklyn, N. Y.
Davis & Zuckerman, 514 E. 11th, New York, N. Y.
Delta Star Electric Co., 2437 Fulton, Chicago, Ill.
Dick Bros., Inc., Reading, Pa.
Erie Bronze Co., 1832 Chestnut, Erie, Pa.
Eureka Metal Products Corp., 2210 Elmwood Ave., Buffalo, N. Y.
Faries Mfg. Co., Decatur, Ill.
Federal-Mogul Corp., Shoemaker & Lillibridge Sts., Detroit.
Harnach Bronze & Foundry Co., John, 11612 Madison Ave., Cleveland, O.
Johnson Bronze Co., New Castle, Pa.
McGill Metal Co., Valparaiso, Ind.
National Bronze & Aluminum Foundry Co., 88th & Lazy, Cleveland, O.
Ohio Pattern Wks. & Fdy. Co., 2730 Spring Grove Ave., Cincinnati, O.
Rabun Bronze Foundry, 617 West Belgrave, Huntington Park, Cal.
Sterling Art Metal Wks., 40 Purvis, Long Island City, N. Y.
Tenual. See National Bronze & Aluminum Foundry Co.
United Metal Mfg. Co., Inc., 25 Shipping, Norwich, Conn.

CASTINGS, Steel

Bonney-Floyd Co., Marion Rd., Columbus, Ohio
Eastern Steel Casting Co., Ave. L & Edward St., Newark.
Northwestern Steel & Iron Corp., 2207 Fourth, S. E., Minneapolis, Minn.

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Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Prestea. See Northwestern Steel & Iron Corp.
Riverside Steel Casting Co., Jacobus Ave., Kearney, N. J.
Sivyer Steel Castings Co., Milwaukee, Wis.

CEMENT, Commutator

Anemoriute. See Technical Products Co.
Commutator Companion. See Withington Div. of Marnot Co.
Conductalute. See Technical Products Co.
Early, Edward E., 1129 W. Fifth, N. W., Canton, O.
Fixkwick. See Technical Products Co.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Electric Co.
Martindale Elec. Co., 1393 W. Fourth, Cleveland, O.
Mitchell Rand Mfg. Co., 19 Vesey, New York, N. Y.
Perce-Lute. See Perfection Supply Co.
Perfection Supply Co., 98 Park Pl., New York, N. Y.
Plas Mica Co., 26 St. Andrews Place, Yonkers, N. Y.
Porce-Lute. See Perfection Supply Co.
Technical Products Co., Pittsburgh, Pa.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Withington Div. of Marnot Co., 50 Thayer, Boston, Mass.

CEMENT, Liquid Porcelain

Anchorlute. See Technical Products Co.
Color-Bestos. See Technical Products Co.
Fire Lute. See Technical Products Co.
Insa-Lute. See Technical Products Co.
Ohmite Co., Passaic, N. J.
Patch-O-Namel. See Technical Products Co.
Repairet Mfg. Co., Milwaukee, Wis.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Technical Products Co., Pittsburgh, Pa.
Thermoid. See Technical Products Co.

CHAIN, Chandelier (Fancy). See Crystals, Chandelier.
CHAIN DRIVES. See Chain, Power Transmission.

CHAIN, Fixture

Acco. See American Chain Co.
American Chain Co., Bridgeport, Conn.
Chase Brass & Copper Co.
Eastern Chain Works, 509 E. 22nd St., New York, N. Y.
Faries Mfg. Co., Decatur, Ill.
Globe Metal Mfg. Co., Haggert & Emerald Sts., Philadelphia, Pa.
H. & O. Chain Co., So. Norwalk, Conn.
Newark Metal Mfg. Co., 22 S. 6th, Newark, N. J.
Plume & Atwood Mfg. Co., Waterbury, Conn.
Reed Mfg. Co., 200 Hudson, New York, N. Y.
Steele & Johnson Mfg. Co., Waterbury, Conn.
Universal Metal Chain Co., 75 Clymer, Brooklyn, N. Y.

CHAIN, Power Transmission

Baldwin Chain & Mfg. Co., Worcester, Mass.
Boston Gear Wks. Sales Co., Norfolk Downs, Mass.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Link-Belt Company, 910 S. Michigan Ave., Chicago, Ill.
Morse Chain Co., Ithaca, N. Y.
Ramsey Chain Co., Inc., Albany, N. Y.
Reeves Pulley Co., Columbus, Ind.
Renold Boston. See Boston Gear Wks.
Union Chain & Mfg. Co., Sandusky, O.
Whitney Mfg. Co., Hartford, Conn.

CHAIN, Socket

American Ball Chain Works, 13 Wooster St., New York.
Bead Chain Mfg. Co., Bridgeport, Conn.
H. & O. Chain Co., South Norwalk, Conn.

CHANDELIER BEADS. See Crystals, Chandelier.
CHANDELIER CRYSTALS. See Crystals, Chandelier.
CHANDELIER FRINGE. See Crystals, Chandelier.

CHARGERS, Magnet

Charging, Remagnetizing.
Colpin Corp., 6110 S. Main, Los Angeles, Cal.
Cowie Elec. Co., E. S., 1822 Wyandotte, Kansas City, Mo.
Fuss Elec. Mfg. Co., 5355 Wabada Ave., St. Louis, Mo.
Luma Elec. Equipment Co., Toledo, O.
Scintilla Magneto Co., Inc., Sidney, N. Y.
Valley Electric Co., 4231 Forest Park Blvd., St. Louis, Mo.

CHEMICALS, Battery

Electrolyte, Battery Salts, Battery Oxides, Sal Ammoniac, Bluestone, Manganese.
Cooper & Co., Charles, 194 Worth, New York, N. Y.
Elmer & Amend, 205 3rd Ave., New York, N. Y.
Electrex. See Goodyear Chemical Co., Inc.
Electro Chemical Co., 113 W. Court St., Dayton, O.
General Metallic Oxides Co., Jersey City, N. J.
Globe Chemical Co. Murray Rd. and Big Four R. R. (St. Bernard), Cincinnati, O.
Goodyear Chemical Co., Inc., 20 W. 22nd, New York, N. Y.
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.
Kalbfleisch Corp., 200 5th Ave., New York, N. Y.
Klipstein Co., 644 Greenwich, New York, N. Y.
Lightning Co., St. Paul, Minn.
Merrimac Chemical Co., 148 State, Boston, Mass.
Powers-Weightman-Rosengarten Co., Philadelphia, Pa.
Voltah. See Powers-Weightman-Rosengarten Co.
Wah Chang Trading Corp., 233 Broadway, New York, N. Y.

CHEMICALS, Refrigeration

Arctic. See Roessler & Hasslacher Chemical Co.
Calco Chemical Co., Bound Brook, N. J.
Carbide & Carbon Chemicals Corp., 30 E. 42nd, New York, N. Y. (Butane & Isobutane.)
Dry Ice Corp. of America, 50 E. 42nd, New York, N. Y.

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Roessler & Hasslacher Chemical Co., 709 Sixth Ave., New York, N. Y. (Methyl Chloride, Ethyl Chloride.)
Virginia Smelting Co., West Norfolk, Va. (Sulphur Dioxide.)
Chromium Plating. See Plating & Finishing.

CHUCKS, Magnetic

J & H Elec. Co., 200 Richmond, Providence, R. I.
Simmons. See Taft-Pierce Mfg. Co.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Walker Co., O. S. (Rockdale), Worcester, Mass.

CIRCUIT BREAKERS

Air and Oil Circuit Breakers and Oil Break Switches
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Anderson Mfg. Co., Albert & J. M., 289 A St., Boston, Mass.
Automatic Reclosing Circuit Breaker Co., Columbus, O.
Burkaw, Inc., 30 Court, Newark, N. J.
Burke Controller Co., 869 Lexington Ave., New York, N. Y.
Condit Elec'l Mfg. Corp., 842 Summer St. (South Boston), Boston, Mass.
Cutler-Hammer, Inc., 1238 St. Paul Ave., Milwaukee. (Mercury Type).
Domestic Elec. Co., Kent, O.
General Electric Co., Section W-234, Bridgeport, Conn.
Hart & Hegeman Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Hartman Electrical Mfg. Co., 31 E. Fifth, Mansfield, Ohio.
Heinemann Electric Co., Penn Ave. & Plum, Trenton, N. J.
High Tension Elecl. Specialty Co., 540 Washington, Abington, Mass.
Hitesco. See High Tension Elecl. Specialty Co.
H. & H. See Hart & Hegeman Div.
Inducto-therm. See Allen-Bradley Co.
I. T. E. Circuit Breaker Co., 19th and Hamilton Sts., Philadelphia, Pa.
Lima Material Co., South Milwaukee, Wis. (Oil Switches.)
Maple Co., R. H., 3156 Ruckle, Indianapolis, Ind.
Martindale Elec. Co., 1342 W. Fourth, Cleveland, O.
Minibraker. See Burke Controller Co.
Re-Cirk-It. See Heinemann Elec. Co.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Sentinel. See Westinghouse Elec. & Mfg. Co.
Takamine Corp., 208 Rawson, Long Island City, N. Y.
Time-O-Stat Controls Co., Elkhart, Ind.
U-Re-Lite. See I. T. E. Circuit Breaker Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

CIRCUIT TESTERS. See Testers, Fuse and Circuit.
CLEANER BAGS, Vacuum. See Bags, Vacuum Cleaner.
CLEANER BRUSHES, Vacuum. See Brushes for Vacuum Cleaners.

CLEANERS, Metal

Oakite Products, Inc., 26 Thames, New York, N. Y.

CLIPS, Fuse. See Fuse Clips.

CLIPS, Heater Plug

Gray Bros. Co., Plano, Ill.

CLOCK SWITCHES. See Switches, Time.
CLOTH GEARS. See Gears and Pinions, Composition.
CLOTH LOUD SPEAKER DIAPHRAGM. See Cloth, Untreated.
CLOTH RADIO GRILL. See Cloth, Untreated.

CLOTH, Untreated

Boyle & Co., John, 112 Duane, New York, N. Y.
Canvas, "Aeroplane Cloth," Cotton Duck, Drill, Diaphragm Cloth, Grill Fabrics, etc.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Tindall Fabrics Corp., 200 Madison Ave., New York, N. Y. (Grill Cloth)
Walker Cotton Fabrics Co., 327 S. La Salle, Chicago, Ill.

CLOTH, WIRE

(For Radio Tube Screens)
Buffalo Wire Works Co., 568 Terrace, Buffalo, N. Y.

CLOTH AND PAPER, Insulating

Cloth, Insulated . . . . . See C
Paper, Insulated . . . . . See P
Fibre Paper (Fish Paper) . . . . . See F
Press Board (Fuller Board) . . . . See B
Silk . . . . . See S

Asme Wire Co., New Haven, Conn.	C	S	P	. .
Armco. See Rogers Paper Mfg. Co.				
Armatite. See Mica Insulator Co.				
Behr-Manning Corp., Troy, N. Y.			P	. .
Brand & Co., Wm., 268 4th Ave., New York.			P	. .
Campbellite. See National Vulcanized.				
Carboloid Products Corp., 98 Front, Brooklyn, N. Y.	C	. .	P	. .
Case Brothers, Inc., Highland, Park, Conn.			P	B
Case Mfg. Co., Unionville, Conn.			P	. .
Case & Risley Press Paper Co. Oneco, Conn.				
Cellma. See Tarentum Paper Mills Co.				
Celoron Co., Div. of Continental Diamond Fibre Co., Bridgeport, Pa.			P	F B
C-F. See National Vulcanized Fibre Co.				
Chicago Mica Co., 345 Campbell, Valparaiso, Ind.	C	. .	. .	. .
Columbian Rope Co., Auburn, N. Y.			P	. .
Continental-Diamond Fibre Co., Newark, Del.			P	. .
Consumers Rubber Co., 1302 Ontario, N., Cleveland, O.			P	. .
Coruco. See Consumers Rubber Co.				
De Jonge & Co., Louis, 69 Duane, New York, N. Y. (Condenser)			P	. .
Dexstar. See Dexter & Sons.				
Dexter & Sons, C. H., Windsor Locks, Conn (Condenser Tissue.)			P	. .
Dielectric Mfg. Co., St. Louis, Mo.	C	S	P	B
Electra. See Tarentum Paper Mills Co.				
Electrite. See West Virginia Pulp & Paper Co.				
Fyberoid. See Wilmington Fibre Specialty Co.				
General Electric Co., Merchandise Dept., Bridgeport, Conn.	C	. .	P	. .
chandise Dept., Bridgeport, Conn.	C	. .	P	. .
Hartford City Paper Co., Hartford City, Ind. (Glassine Condenser Tissue).				
Hewitt & Bros., C. B., 16 Perry, New York	C	. .	P	. .
Hi-Tex. See Stevens Paper Mills.				
Hollingsworth & Vose Co., 333 Washington, Boston, Mass.			P	. .
Incella. See Tarentum Paper Mills Co.				
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.				F . .
Irvington Varnish & Insulator Co., Irvington, N. J.	C	S	P	. .
Manning Paper Co., J. A., Troy, N. Y.				B
Mica Insulator Co., 200 Varick, New York	C	S	P	. .
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.	C	S	P	F B
National Vulcanized Fibre Co., Wilmington, Del.				F . .
New Jersey Wood Finishing Co., Amboy Ave., Woodbridge, N. J.	C			
Ohmoid. See Wilmington Fibre Specialty Co.				
Old Hick. See Hewitt & Bros., C. B.				
Peerless. See National Vulcanized Fibre Co.				
Riegel Paper Corp., 342 Madison Ave., New York, N. Y.			P	. .
Rogers Paper Mfg. Co., So. Manchester, Conn.				B
Schweitzer, Inc., Peter J., 299 Fifth Ave. New York, N. Y. (Condenser Tissue.)				
Stico. See Standard Insulation Co.				
Spaulding Fibre Co., Tonawanda, N. Y.				F . .

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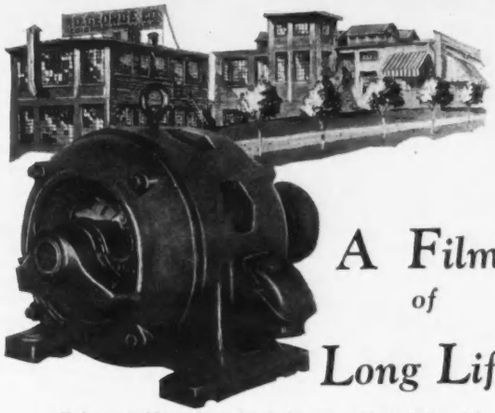

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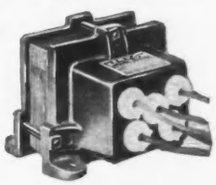

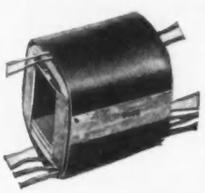

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Standard Insulation Co., East Rutherford, N. J. ..... C S P ....
Sterling Fireboard Co., 501 Fifth Ave., New York. (Varnished Hard Fibreboard) ..... P
Sterlite. See Sterling Firebrand Co.
Stevens Paper Mills, Windsor, Conn. ..... S
Tarentum Paper Mills Co., Tarentum, Pa. ..... P ....
Turbonite. See Brand & Co., Wm.
Union Mills Paper Mfg. Co., New Hope, Pa. ..... P ....
West Virginia Pulp & Paper Co., 230 Park Ave., New York ..... S
Wilmington Fibre Specialty Co., Wilmington, Del. ..... P ....

CLUTCHES, Magnetic
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis

COIL (Coils),
Armature and Field. See Coils, Finished.
Choke (Radio). See Radio Circuit Components.
Driers & Impregnators. See Ovens.
Electromagnet. See Coils, Finished.
Flatteners. See Rolls, Coil Flattening.
High Frequency. See Electro-Therapeutic; also Radio Circuit Components; also Ignition Outfits.
Impregnators, Vacuum. See Ovens, Industrial.
Induction. See Coils, Finished; also Electro-Therapeutic
Loop Benders. See Benders, Coil Loop.
Medical. See Electro-Therapeutic.
Pressers. See Presses, Armature Coil.
Radio. See Radio Circuit Components.
Removers. See Removers, Coil.
Resistance. See Units, Rods & Grids; also Radio Circuit Components.
Shaping Machines. See Shaping Machines, Coil.
Spark. See Ignition Outfits.
Spreaders. See Winding Machines, Armature and Field.
Tamping Tools. See Tools, Coil Tamping.
Taping Machines. See Taping Machines, Coil.
Testers. See Testers, Coil; also Test Benches, Armature
Winders, Armature & Field Coil. See Winding Machines, Armature & Field Coil.
Winders, Induction Coil. See Winding Machines, Industrial Coil.
Winding Forms. See Forms, Coil Winding.
Windings (Magneto). See Coils, Finished.
Wire Tension Devices. See Tension Devices, Coil Wire.

COILS, Finished
Armature, Field, Electromagnet and Induction Coils.
Acme Wire Co., New Haven, Conn
Aero Products, Inc., 4611 Ravenswood Ave., Chicago, Ill.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Armature Co., 7500 Stanton, Cleveland, Ohio
Auth Electrical Specialty Co., 422 E. 53rd St., New York.
A. & A. See Electrical Coil Winding Co
Belden Mfg. Co., 4633 W. Van Buren, Chicago, Ill.
Bunnell & Co., J. H., 215 Fulton, New York, N. Y.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Concourse Electric Co., 204 E. 137th, New York, N. Y.
Coto Coil Div. of Universal Winding Co., Providence, R. I.
Ditmar Elec. Co., Brookline, Mass.
Dudlo Mfg. Co., Div. of General Cable Corp., Fort Wayne, Ind.
Easton Coil Co., Easton, Pa.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O.
Electric Valve Mfg. Co., 64 Murray, New York, N. Y.
Electrical Coil Winding Co., 2735 Saunders, Camden, N. J.
Fredericks Co., H. M., 1315 S. Wabash Ave., Chicago, Ill.
Globe Technolian Corp., Reading, Mass.
Herald Electric Co., 29 East End Ave., New York, N. Y.
Ideal Mfg. Co., Fort Wayne, Ind.
Marion Elec. Mfg. Co., 24 Cliff, Jersey City, N. J.
National Elec. Corp., 726 High, Newark, N. J.
Palmer Corp., Chas., 786 Broad, Newark, N. J. (Solenoids.)
Polymet Mfg. Corp., 829 E. 134th St., New York, N. Y.
Power Transformer Co., 145 W. 22nd, New York, N. Y.
Reimer Mfg. Co., W. H., Hagerstown, Md
Robertson-Davis Co., 363 W. Superior, Chicago, Ill.
Robertson, Lee F., Inc., 532 West 22nd St., New York.
Rome Wire Co. (Div. of General Cable Corp.), Rome, N. Y.
States Co., 19 New Park Ave., Hartford, Conn.
Stunz & Barron, 210 E. Pratt, Baltimore, Md.
Toledo Standard Commutator Co., 2242 Sneed Ave., Toledo, O.
Universal Armature Corp., Cambridge, Mass.
Varley Duplex Magnet Co., 15 Exchange Place, Jersey City, N. J. (Electromagnetic only)
Wheeler Insulated Wire Co., Bridgeport, Conn.

COMMUTATOR
Bars. See Bars, Commutator.
Cement. See Cement, Commutator.
Dressers. See Stones, Commutator.
Lubricants. See Compounds, Commutator.
New. See Commutators.
Refilled. See Repairing and Second Hand.
Slotters. See Slotting Machines & Tools, Commutator
Slotting Files. See Files, Commutator Slotting.
Soldering Machines. See Soldering Machines, Commutator
Stones. See Stones, Commutator.
Tighteners. See Tighteners, Commutator.
Truing Devices. See Tools, Commutator Truing.

COMMUTATORS
Armature Co., 7500 Stanton Ave., Cleveland, Ohio.
Cameron Electric Mfg. Co., Ansonia, Conn.
Cleveland Commutator Co., 1882 E. 55th, Cleveland, O.
Derby Commutator Co., Derby, Conn.
Electric Materials Co., North East, Pa.
Eureka Metal Products Corp., 2210 Elmwood Ave., Buffalo, N. Y.
Homer Commutator Co., 4748 Hough Ave., Cleveland.
Toledo Standard Commutator Co., Toledo, O.

COMMUTATOR BRUSHES. See Brushes, Commutator
COMPOSITION PULLEYS. See Pulleys, Composition.

COMPOUNDS, Commutator
Allen Co., Inc., L. B., 6752 Bryn Mawr Ave., Chicago, Ill.
Armstrong. See Elec. Power Maintenance.
Chicago Solder Co., 4201 Wrightwood Ave., Chicago, Ill.
Consistency. See Warren Lubricant Co.
Cramolin, Inc., 25 W. 43rd St., New York, N. Y.

Dixon Crucible Co., Jos., Monmouth, Jersey City, N. J.
Doe & Co., Walter S., Kent, Ohio.
Goldmark Co., James, 83 Warren, New York, N. Y.
Kester Solder Co., 4210 Wrightwood Ave., Chicago, Ill.
Perfection. See Warren Lubricant Co.
Sanderson. See Warren Lubricant Co.
Spermo. See Warren Lubricant Co.
Trotters. See Goldmark Co., James.
Warren Lubricant Co., 22 Maurice, Buffalo, N. Y.
COMPOUNDS, Sealing. See Wax and Compounds.

CONDENSER UNITS, Refrigerator
Bush Mfg. Co., Hartford, Conn.
McCord Radiator & Mfg. Co., Bionelle & E. Grand Ave., Detroit, Mich.
Roome-Turney Radiator Co., Rome, N. Y.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

CONDENSER, Electric
Sevison Magneto Engineering Co., 379 Phillips Ave., Toledo,
CONDENSERS, Radio. See Radio Circuit Components.
CONDENSER TUBING. See Tubing, Brass and Copper

CONNECTORS, Wire
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill. (Solderless-Tapeless).
CONTACT POINTS. See Points, Contact.
CONTAINERS, Shipping. See Fibre Board Products.

CONTROLLERS, Motor
Aclinestor. See Sundh Elec. Co.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Automatic Switch Co., 154 Grand, New York, N. Y.
Betts, Inc., James H., 1393 Sedgwick Ave., New York, N. Y. (Traffic.)
Burkau, Inc., 20 Court, Newark, N. J.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
B-Q Oil Burner Co., 324 S. California Ave., Stockton, Cal.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Condit Elec'l Mfg. Corp., 842 Summer (South Boston) Boston, Mass.
Cutler-Hammer Mfg. Co., 1288 St. Paul Ave., Milwaukee.
Diamond Elect. Mfg. Co., 1330 N. 16th, Los Angeles, Cal.
Dinkey. See Elec. Controller & Mfg. Co.
Dunco. See Struthers Dunn, Inc.
E. C. & M. Youngstown. See Electric Controller & Mfg. Co.
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland, O.
Electrite. See Sundh Elec. Co.
Hercules. See Union Elec. Mfg. Co.
General Electric Co., Schenectady, N. Y.
Horni Signal Mfg. Corp., 515 Greenwich, New York.
Industrial Controller Div. of Square D Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Maimin Speed Control Corp., 251 W. 19th, New York. (Sewing Machines.)
Monitor Controller Co., 51 Gay, Baltimore, Md.
National Electric Controller Co., 5315 Ravenswood Ave., Chicago, Ill.
Refrigerating Specialties Co., 728 S. Sacramento Blvd., Chicago, Ill.
Resisto. See Allen-Bradley Co.
Rowan Controller Co., 306 N. Holliday, Baltimore, Md
Square D Co., Detroit, Mich.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Sundh Elec. Co., 209 Parkhurst, Newark, N. J.
Switcholone. See Condit Elec. Mfg. Co.
Thermaload. See Monitor Controller Co.
Trumbull Electric Mfg. Co., Plainville, Conn
Ward Leonard Elec. Co., 31 South, Mount Vernon, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
W. K. See Westinghouse Elec. & Mfg. Co.
Wright. See Electric Controller & Mfg. Co.
COPPER. See Brass, Bronze and Copper; also Castings
COPPER TUBING. See Tubing, Brass and Copper
CORD TIPS. See Tips, Cord.
CORD, Tinsel. See Tinsel Cord & Thread.

CORDS, Extension
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.

CORES, RESISTANCE COIL (Lava)
American Lava Corp., 1425 William, Chattanooga, Tenn.
Crescent. See M. Kirchberger & Co.
Es-El-Co. See Southern Lava Co.
Kirchberger & Co., M., 1425 37th, Brooklyn, N. Y.
Lavite. See Steward Mfg. Co.
Lavarock. See M. Kirchberger & Co.
Southern Lava Co., Rossville, Ga.
Steward Mfg. Co., D. M., Chattanooga, Tenn.
Tennessee Burner Mfg. Co., Chattanooga, Tenn.
XL. See Tennessee Burner Mfg. Co.

CORES, RESISTANCE COIL (Refractory Porcelain)
American Lava Corp., 1425 William, Chattanooga, Tenn.
Colonial Insulator Co., Akron, O.
Crowley & Co., Henry L., 1 Central Ave., West Orange, N. J.
Electrical Refractories Co., East Palestine, O
Elemite. See Louthan Mfg. Co.
Firelite. See Hartford Faience Co.
Hartford Faience Co., Hartford, Conn.
Louthan Mfg. Co., E. Liverpool, O.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Thermal Syndicate, 58 Schenectady Ave., Brooklyn, N. Y.
Vitreosil. See Thermal Syndicate.
COTTON DUCK. See Cloth, Untreated.
COTTON SLEEVING. See Tape, Cotton.
COUNTERS, Revolution. See Tachometers.

COUPLINGS, Shaft (Flexible-Insulated)
Ajax Flexible Coupling Co., Westfield, N. Y.
Bartlett Hayward Co., Scott & McHenry, Baltimore, Md.
Bond Co., Charles, 617 Arch, Philadelphia, Pa.
Brown Engineering Co., 123 N. Third, Reading, Pa.
Falk Corp., Milwaukee, Wis.
Delbee Rubber Co., Syracuse, N. Y.
Francke. See Smith & Serrell.
General Electric Co., Schenectady, N. Y.
Grundy. See Bond Co.
Hill Clutch Machine & Foundry Co., 6400 Breakwater Ave., Cleveland, Ohio.
Kanti Lever. See Brown Engineering Co.
Krone-Seebek Die Casting & Mfg. Co., 2935 W. 47th, Chicago, Ill.
Lovejoy Tool Wks., 325 W. Ohio, Chicago, Ill.
LR. See Lovejoy Tool Wks.
Mather. See Bond Co.
Nuttall Wks., of Westinghouse Elec. & Mfg. Co., McCandless Ave. & Harrison St., Pittsburgh, Pa.
Oneida. See Delbee Rubber Co.
Smith & Serrell, 5 Halsey, Newark, N. J.

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Webster Mfg. Co., 1856 N. Kostner Ave., Chicago, Ill.
Wood's Sons Co., T. B., Chambersburg, Pa.
COVERING MACHINES, WIRE. See Wire Manufacturing Machines.

COVERS, Paper and Fabric
For Lamp Shades, Paper & Fabric, Fans, Radio & Appliances.
Adjusto. See Phoenix Import Co.
Arkel Safety Bag Co., 10 E. 40th St., New York, N. Y.
(For Motors, Fans, Lamp Shades.)
Boyle Co., John, 121 Duane, New York, N. Y. (Fan.)
Droutman Mfg. Co., 36 W. 60th, New York, N. Y.
Empire Shield Co., 590 Broadway, New York, N. Y.
Kennedy Car Liner & Bag Co., Shelbyville, Ind.
Lansing Sales Co., 24 Harvard, Boston, Mass.
La Rose Mfg. Co., 757 Sixth Ave., New York, N. Y. (Rubberized Fan.)
Phoenix Import Co., 45 E. 25th, New York, N. Y. (Shade.)
Superb. See Droutman Mfg. Co.
Superior. See Empire Shield Co.
CRUCIBLES, Porcelain. See Porcelain.
CRANES, Floor. See Lifts, Armature.

CRYSTALS, Chandelier
Crystals, Prisms, Beads, Chains, Fringes.
Crystal Venezia. See Harrison & Co., Arthur.
Foslite. See Harrison & Co., Arthur.
Friedlaender Co., 49 W. 23rd, New York, N. Y.
Harrison & Co., Arthur, 561 W. Washington Blvd., Chicago.
Hirschberg, Shuts & Co., 368 4th Ave., New York, N. Y. (Fringes.)
Nelson Read Co., 15 W. 37th, New York, N. Y. (Importer.)
Rialto Import Co., 112 W. 44th, New York, N. Y.
Schwartz Lighting Fixture Wks., 1341 Noble, Philadelphia
Wyle & Bros., J. J., 20 E. 27th, New York, N. Y.

CUPS, Grease
Gits Bros. Mfg. Co., 1940 S. Kilbourn Ave., Chicago, Ill.
Lunkenheimer Co., Cincinnati, Ohio.

CUPS, Oil
Gits Bros. Mfg. Co., 1940 S. Kilbourn Ave., Chicago, Ill.
Tucker, Inc., W. W. & C. F., 618 Capital Ave., Hartford, Conn.
CUT OUTS, Battery. See Switches, Battery.
CUTTING OUTFITS, Metal. See Welding and Cutting Outfits.
CURRENT INDICATORS. See Instruments, Pocket.
DASHBOARD METERS. See Instruments, Portable and Switchboard.

DECALCOMANIA
Meyercord Co., Chicago, Ill.
Novar. See Palm Fechteler & Co.
Palm Fechteler & Co., 67 5th Ave., New York, N. Y.

DIALS
Radio (Metal). See Radio Mountings.
Radio (Molded). See Radio Molded Parts.
Enameled. See Dials, Enameled.

DIALS, Enameled
Whittier Co., Horace R., Pequabuck, Conn.
DIAPHRAGM, Cloth. See Cloth, Untreated
DIE CASTINGS. See Castings, Die.

DIE CASTING MACHINES
Allied Die Casting Corp., Long Island City, N. Y.
Madison-Kipp Corp., 211 Waubesa, Madison, Wisc.
DIE MAKERS. See Dies, Die makers.

DIE SETS
Baumbach Mfg. Co., 1810 Kilbourn Ave., Chicago, Ill.
Danly Machine Specialties, Inc., 2104 S. 52nd Ave., Chicago, Ill.
Diamant Tool & Mfg. Co., 401 Mulberry, Newark, N. J.
DIES, Pipe. See Stocks, Dies and Reamers.

DIES, DIE MAKERS
Beaver Mfg. Co., 625 N. Third, Newark, N. J.
Caldbeck Tool & Mfg. Co., 307 East Third, Des Moines, Iowa.
Chicago Molded Products Co., 2148 Walnut, Chicago, Ill.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J.
Kuhn & Jacob Machine & Tool Co., 502 Prospect Ave., Trenton, N. J.
Madison-Kipp Corp., 211 Waubesa, Madison, Wis.
Mareck & Nebel 255 Greenwich, New York, N. Y.
Stein & Co., Wm. P., 424 St. Paul, Rochester, N. Y.

DIMMER, Theatre
Ward Leonard Elec. Co., 31 South, Mount Vernon, N. Y.

DISCS, Armature
Steel Discs, Laminations, and Segments for Motors and Transformers.
American Stamping Co., 978 E. 64th, Cleveland, O.
Armature Co., 7500 Stanton Ave., Cleveland, O.
Cleveland Armature Works, 4732 St. Clair Ave., Cleveland
Hercules Elec. Steel Corp., 145 Lafayette, New York, N. Y.
Johnson, H. D., 170 Mahncke Court, San Antonio, Texas
Niagara Machine & Tool Wks., 637 Northland, Buffalo
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.
Willor Mfg. Corp., 117 Mercer, New York, N. Y.
DRAWING MACHINES, WIRE. See Wire Drawing Mach.
DRIVE SCREWS. See Screws, Drive.
DRIVES, CHAIN. See Chain, Power Transmission.

DYNAMOMETERS
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Diehl Mfg. Co., Elizabeth, N. J.
General Electric Co., Schenectady
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
EBONITE. See Rubber, Hard.
ELECTROLYTE. See Chemicals, Battery.
ELECTROMAGNETS. See Coils, Finished.

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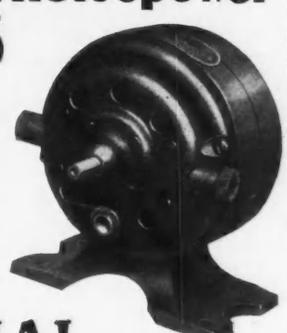

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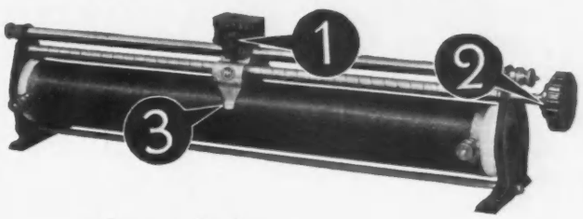

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American Sign Co., Cincinnati, Ohio.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
G. H. S. De Vry Corp., 333 N. Michigan Ave., Chicago.
ELECTRODYNAMOMETERS. See Instruments, Laboratory Standard.

ELECTRO MAGNETS

Varley Duplex Magnet Co., 15 Exchange Pl., Jersey City, N. J.
ELEMENTS. Heating. See Units, Rods and Grids.

ENAMELING MACHINES (For Magnet Wire)

(See Also Wire Manufacturing Machines).
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
Sleeper & Hartley, Inc., 335 Chandler, Worcester, Mass

ENGRAVING MACHINES

Portable Bench and Pedestal Outfits for Marking Metal.
Dackal. See Preis & Co., Inc., H. P.
Eisler Electric Corp., 770 S. 13th, Newark, N. J.
(Tube Base Branders)
Engravograph Corp., 12 Vestry, New York, N. Y.
Etchograph. See Brewster Co., Wm.
Gilbert Supply Co., Independence, Iowa.
Gorton Machine Co., Geo. Racine, Wis.
Luma Elec. Equipment Co., Toledo, O.
Preis & Co., Inc., H. P., 227 Fulton, New York, N. Y.
Schmidt, Inc., Geo. T., 4102 Ravenswood Ave., Chicago, Ill.
Simplex Tool Co., Woonsocket, R. I.

ENGRAVING, Radio Panel

Engraving to Order.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa.
Etch-O-Gravure. See Insuline Corp. of America.
General Fabricating Co., 165 Greenwich, New York, N. Y.
Globe Mfg. Co., 101 Spokane St., Seattle, Wash.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Mechanical Engraving Co., 130 Orchard, Newark, N. J.
Preis & Co., Inc., H. P., 227 Fulton, New York, N. Y.
Schmidt, Inc., Geo. T., 4102 Ravenswood Ave., Chicago, Ill. (Tube Base Branders).
Schwenke Machine Engraving Co., 2086 Woodward Ave., Detroit, Mich.
Verichrome Laboratories, 4614 Spring Grove Ave., Cincinnati
Wright Radio Co., 114 Exchange, Rockland, Mass.
ESCUTCHEONS, Radio. See Radio Mountings.

EYELETS

Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
Platt Bros. & Co., Waterbury, Conn.
Waterbury Button Co. (Elecl. Mfg. Dept.), Waterbury, Conn.
FABRIC, Radio Grill. See Cloth, Untreated.
FABRIC SHADES. See Shades, Fabric.
FAN BLADES. See Blades, Fan.
FAN GUARDS. See Forms, Wire.

FEET, Felt

Brawley Felt Co., Inc., T. R., 279 20th, Brooklyn, N. Y.
Mattatuck Mfg. Co., Waterbury, Conn.

FELT

American Felt & Cutting Co., 609 W. Lake, Chicago, Ill.
American Felt Co., 315 Fourth Ave., New York, N. Y.
Booth Felt Co., 460 18th, Brooklyn, N. Y.
Brawley Felt Co., Inc., T. R., 279 20th, Brooklyn, N. Y.
Western Felt Wks., 4029 Ogden Ave., Chicago, Ill.

FERRULES

Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh.
Chase Brass & Copper Co., Waterbury, Conn.
Clark Metal Products, 490 Hancock Ave., Bridgeport, Conn.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Massachusetts Machine Shop, Inc., Boston, Mass.
Monowatt Elec. Corp., 2 W. 40th, New York, N. Y.
Patton-MacGuyer Co., Providence, R. I.
Platt Bros. & Co., Waterbury, Conn.
Risdon Mfg. Co., Naugatuck, Conn.
Scovill Mfg. Co., 99 Mill, Waterbury, Conn.
Waterbury Brass Goods Corp., Waterbury, Conn.
Waterbury Button Co. (Elecl. Mfg. Dept.), Waterbury, Conn.

FIBRE BOARD PRODUCTS (Solid and Corrugated)

Container Corp. of America, 111 W. Washington, Chicago, Ill.
FIBER CANDLES. See Candles, Fixture.
FIBRE GEARS. See Gears and Pinions, Composition.
Paper. See Cloth and Paper.
Radio Panels. See Radio Molded Parts.
Shipping Containers. See Fibre Board Products.
Vulcanized. See Fibre, Vulcanized.

FIBRE, Phenol

Moisture Proof; Sheet, Rod, Tubes.
Aico. See American Insulator Corp.
Amerine. See American Insulator Corp.
Armite. See Spaulding Fibre Co.
Bakelite-Dilecto. See Continental Fibre Co.
Conite. See Continental-Diamond Fibre Co.
Continental-Diamond Fibre Co., Newark, Del.
Electrical Insulation Corp., 308 W. Washington, Chicago, Ill.
Fibroc Insulation Co., 245 Lincoln Ave., Valparaiso, Ind.
Formica Insulation Co., 4638 Spring Grove Ave., Cincinnati, O.
Franklin Fibre Specialty Co., Wilmington, Del
Laminated Phenol, Inc., 1228 S. Western Ave., Chicago, Ill.
Micarta. See Westinghouse Elec. & Mfg. Co.
National Vulcanized Fibre Co., Wilmington, Del.
Phenolite. See National Vulcanized Fibre Co.
Spaulding Fibre Co., Tonawanda, N. Y.
Synthane Corp., Oaks, Pa.
Textolite. See Electrical Insulation Corp.
Vul-Cot. See National Vulcanized Fibre Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

FIBRE, Vulcanized

Sheet, Rod, Tube, Horn, Fibre, Bushings, Washers, Cleats, Screw Machine Products.
Brandywine Fibre Products Co., 1402 Walnut St., Wilmington, Del.
Conite. See Continental-Diamond Fibre Co.
Continental-Diamond Fibre Co., Newark, Del.
Diamond F. See Continental-Diamond Fibre Co.
Delaware Hard Fibre Co., Box 970M, Wilmington, Del.
Egyptian. See Delaware Hard Fibre Co.
Electrosote. See Pantasote Co.
Fibro Products Co., New Bedford, Mass.
Franklin Fibre Specialty Co., Wilmington, Del.
Fyberoid. See Wilmington Fibre Specialty Co.
Independent Laboratories, 50 E. 42nd, New York, N. Y.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y.
Iten Fibre Co., 5403 Bower Ave., Cleveland, O.
Lincoln Fibre & Specialty Co., Newport, Del.
National Vulcanized Fibre Co., Wilmington, Del.
Ohmoid. See Wilmington Fibre Specialty Co.
Pantasote Co., Inc., 250 Park Ave., New York, N. Y.
Peerless. See National Vulcanized Fibre Co.
Spaulding Fibre Co., Tonawanda, N. Y.
Standard Fibre Products Co., 36 Pleasant, Watertown, Mass
Vul-Cot. See National Vulcanized Fibre Co.
Vulcawood. See Continental-Diamond Fibre Co.
Wilmington Fibre Specialty Co., Wilmington, Del.
FIBRE WASHERS. See Fibre.
FIELD COILS. See Coils, Finished.

FILAMENTS, Incandescent Lamp

Cohn, Sigmund, 44 Gold, New York, N. Y.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Filament Supply Co., 1317 Willow Ave., Hoboken, N. J.
Gilby Wire Co., Riverside Ave., Newark, N. J.
National-Harris Wire Co., Newark, N. J.
Pierce Mfg. Co., 625 W. Jackson Blvd., Chicago, Ill.
Radis Products Corp., Steneck Trust Bldg., Hoboken, N. J
Volkmer Radio Products Corp., 187 Sylvan Ave., Newark, N. J. (Lead-in-Welds.)
Welcon Industries, Inc., Exton Ave. & Buch, North Arlington, N. J. (Lead-in Welds.)

FILES, Commutator Slotting

Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Martindale Electric Co., 1262 W. Fourth, Cleveland, O.
FISH PAPER. See Cloth and Paper.
FITTINGS, Fixture. See Fixture Fittings.
FIXTURE CANDLES. See Candles, Fixture.
FIXTURE CHAIN. See Chain, Fixture.
FIXTURE, Collars. See Fixture Fittings.

FIXTURE FITTINGS

	KEY
Bowl Holders	See B
Brass Fittings	See B
Canopies	See B
Collars	See B
Crow Feet	See I
Finials (Brass, Glass and Porcelain)	See B
Hangers	See H
Hickies, Brass	See B
Hickies, Iron	See I
Hooks, Brass	See B
Hooks, Iron	See I
Iron Fittings	See I
Loops, Brass	See B
Loops, Iron	See I
Rings	See B
Shade Holders	See S
Shells	See B
Spinnings	See B
Stampings	See B
Stems	See B
Straps	See H
Studs	See I

Acme Lighting Products, Inc., 2114 Woodland Ave., Cleveland, O. "traps" . . . . . H
American Chain Co., Bridgeport, Conn. (Loops and Rings.) . . . . . B . . . .
American Ring Co., Waterbury, Conn. (Candle.) . . . . S . .
Appleton Electric Co., 1703 Wellington Ave., Chicago, Ill. . . . . B I . . .
Arco. See American Ring Co.
Arrow Electric Division of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. . . . . S . .
Artoloid. See Great Eastern Brass Wks., Inc.
Art Metal Co., 3721 Dayton, Cleveland, O. . . . . H
Banlite. See East Side Metal Spinning Co.
Banner. See Plume & Atwood Mfg. Co.
Barton Brass Wks., 3627 Superior, Detroit. . B . . . . .
Belmet. See B. & L. Metal Stamping Co.
Bloch Bros., 88 Walker, New York . . . . . B . . . . .
Brandt Mfg. Co., 3727 Gratiot Ave., Detroit. B . . . . .
Braun, J. G., 609 S. Paulina, Chicago, Ill. (Pressed Ornaments.) . . . . . B I . . .
Bryant Elec. Co., 1421 State, Bridgeport, Conn. . . . S . .
B. & L. Metal Stamping Co., 250 Moore, Brooklyn, N. Y. (Also Combination Wall Bracket Hanger.) . . . . . B I . . H
Cambridge Brass Co., Cambridge, Mass. . . . . B . . . . .
Chase Brass & Copper Co., Waterbury, Conn. B . . S . .
Chatham Metal Spinning & Stamping Corp., 128 Mott, New York, N. Y. . . . . B I . . .
Cleanetty. See Dunlap Co.
Colonial Stamping Co., Brill St. & Passaic Ave., Newark, N. J . . . . . B . . S . .
Crescent Brass Mfg. Co., Spruce & Seventh, Reading, Pa. . . . . B . . . . .
Crouse-Hinds, Solvay Sta., Syracuse, N. Y. . . . . S H
Diamond Needle & Mfg. Co., Torrington, Conn. (Hickies) . . . . . I . . .
Dunlap Co., John, Hammond & Gregg, Carnegie, Pa. . . . . S .
East Side Metal Spinning Co., 451 Greenwich, New York, N. Y. . . . . B . . . . .
Eureka Tin Ware Mfg. Co., 135 W. 20th, New York, N. Y. . . . . S . .
E-Z Up. See Plume & Atwood Mfg. Co.
Faries Mfg. Co., Decatur, Ill. . . . . B I S H
Fixturelite Mfg. Co., 468 W. Broadway, New York, N. Y. . . . . B . . . . H
Flaherty Co., M. E., 28 S. Clinton, Chicago. . . . I . . .
Frallick Co., S. R., 15 S. Clinton, Chicago. . . . I . . .
Franklin Brass Foundry Co., Reading, Pa. . . . B . . . . .
Friedley-Voehardt Co., Chicago. . . . . B . . . . .
Grebler Mfg. Co., 6565 Broadway, S. E., Cleveland, O. . . . . I . . .

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New Wrinkle. See Bryant Elec. Co.
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N. W. Cleat Receptacle Bracket, 2437 N. 29th, Philadelphia, Pa. . . . . I . . .
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Rocale Mfg. Co., 200 Hudson, New York. . . . B . . . H
Sandow Tool Co., 1440 Bway, New York, N. Y. . . . S . .
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Stembridge & Brandt, 25 S. Clinton, Chicago, Ill. (White Metal.) . . . . . B . . . .
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Thomas & Betts Co., 63 Vesey, New York. . . . . I . . .
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Victor. See Plume & Atwood Mfg. Co.
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Waterbury Metal Wares Co., Waterbury, Conn. . . . S . .
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White Mfg. Co., J. H., 79 Madison Ave., New York, N. Y. . . . . B . . S . .
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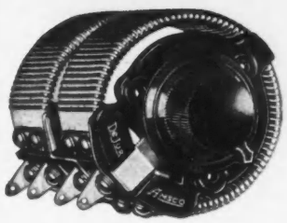

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Wood Electric Co., C. D., 565 Broadway, New York N. Y.
Woodwin. See Wood Elec. Co., C. D.
Wynk-A-Lyte. See Betts & Betts Corp.
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FLEXIBLE ARMS. See Tubing, Flexible Metallic.
FLEXIBLE LEADS, Commutator Brush. See Brushes, Commutator.

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Strand & Co., N. A., 5001 N. Lincoln, Chicago, Ill.
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Scovill Mfg. Co., Waterbury, Conn.

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Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, O.
Comstock Mfg. Co., Wilkes-Barre, Pa.
Master. See Armature Coil Equipment Co.

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Grammes & Sons, Inc., L. F., Allentown, Pa.
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Humason Mfg. Co., Forestville, Conn.
Hunter Pressed Steel Co., Lansdale, Pa.
Idealite Lamp Shade Mfg. Co., 49-55 Fremont, Jersey City, N. J.
Jenkinson & Co., R. C., 293 Washington, Newark, N. J.
Jeschke Wire Specialty Wks., Crawfordsville, Ind.
Krischer's Mfg. Co., 255 Calyer, Brooklyn N. Y.
Manhattan Wire Products Co., 398 First Ave., New York
Matlatuck Mfg. Co., Waterbury, Conn.
Murray Hill Wire Frame Co., 314 E. 62nd, New York N. Y.
No-Draft Fan Fixture Co., 1703 Builder Bldg., Chicago, Ill. (Fan Guard.)
Protectafan Co., 6152 Delmar Blvd., St. Louis, Mo. (Fan Guard.)
Roebling's Sons Co., John A., Trenton, N. J.
Russell Mfg. Co., John M., Naugatuck, Conn.
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Young Industries, Inc., L. A., Detroit, Mich.
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FRICTION TAPE. See Tape, Rubber and Friction.
FRINGE, Chandelier. See Crystals, Chandelier.

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Waterbury Brass Goods Co., Waterbury, Conn.
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FUSE TESTERS. See Testers, Fuse and Circuit.

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Plug	See P
Non-Refillable	See N
Refillable	See R
Open Link	See O
Fuse Wire	See O

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Aluminum Co. of America, 2444 Oliver Bldg., Pittsburgh, Pa. . . . . O
Arkless. See Economy Fuse Mfg. Co.
Automatic Elec. Iron & Fuse Co., 215 S. American, Philadelphia, Pa. . . . . . P . . . . .
Bryant Elec. Co., 1421 State, Bridgeport, Conn.
Bussmann Mfg. Co., University & Jefferson Ave., St. Louis . . . . . C P N R O
Chase-Shawmut Co., Newburyport, Mass.... C P N R O
C-E-Z. See Bryant Elec. Co.
Clearsite. See Economy Fuse & Mfg. Co.
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Colortop. See Trico Fuse Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. (Automobile) . . . . . C . . N R . .
Commercial Enclosed Fuse Co., 1317 Willow Ave., Hoboken, N. J. . . . . . C P N . . .
Cote Bros. Mfg. Co., 182 W. Lake, Chicago C P . . R . .
Crystal. See Royal Elec. Co.
Daum Fuse & Elec. Mfg. Co., 1157 Hodgkins, Pittsburgh . . . . . C . . . . R . .
D. & W. See Graybar Electric Co.
Eagle Electric Mfg. Co., Inc., 49 Hall Brooklyn, N. Y. . . . . . P . . . . .
Economy Fuse & Mfg. Co., 2717 Greenview Ave., Chicago, Ill. . . . . . C P N R . .
Electric Fuseguard Co., Charlottesville, Va.. C P N R . .
Elliott Electric Co., Shreveport, La. . . . . .
Gem. See Jefferson Elec. Co.
General Elec. Co., Merchandise Dept., Bridgeport, Conn. . . . . . C P N R . .
Graybar Electric Co., New York, N. Y. . . . . C . . . . . .
Great Western Fuse Co., 415 Lexington Ave., New York, N. Y. . . . . B . .
H. & H. See Hart & Hegeman.
Hudson Wire Co., Ossining, N. Y. . . . . O
Jefferson Electric Co., 1500 S. Laflen, Chicago, Ill. . . . . C P N R O
Kantark. See Trico Fuse Mfg. Co.
Kirkman Engrg. Co., 1 Dominick St., New York, N. Y. . . . . . C P N . . O
Monarch Fuse Co., 116 E. First, Jamestown, N. Y. . . . . . C . . N B .
National. See Economy Fuse & Mfg. Co.
Neark. See Colt's Patent Fire Arms Mfg. Co.
Pierce Renewable Fuses, Inc., 752 Main, Buffalo, N. Y. . . . . . C P . . R . .
Platt Bros & Co., Waterbury, Conn. . . . . O
Powell, F. W., 119 W. Ohio, Pittsburgh. . . . P . . R . .
Pyrotite. See Bryant Electric Co.
Ree-Nu-It Elec. Co., New Bedford, Mass.. C P . . R . .
Rochester Re-Fill Fuse Co., 402 Cottage, Rochester, N. Y. . . . . . C . . . R . .
Royal Elec. Co., Chelsea Station, Boston.. . . P N . . .
Seco. See U. S. Electric Co.
Shawmut. See Chase-Shawmut Co.
Simplex. See Powell, F. W.
Six-in-One. See Industrial Engrg. Co.
Star Fuse Co., 235 Canal, New York, N. Y. C P . . R . .
Trico Fuse Mfg. Co., 1001 McKinley Ave., Milwaukee . . . . . C P N R . .
Union. See Jefferson Elec. Co.
U.S. Electric Co., 18 Chambers, Trenton, N.J. . . P . . . . .

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GALVANOMETERS. See Instruments, Laboratory Standard.

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Palatine Industrial Co., 111 Fifth Ave., New York, N. Y.
Weber, Alfred, 5 Union Square, New York, N. Y.
GAS SIGN ELECTRODES. See Electrodes for Gas Signs.

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Gutta Percha & Rubber Mfg. Co., 15 Park Row, New York.
Canfield Rubber Co., Bridgeport, Conn.
Wrigley Bros., 356 W. 18th, New York, N. Y.
GAUZE BRUSHES, Wire. See Brushes, Commutator.
GEARS, Fibre. See Gears and Pinions, Composition.

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De Laval Steam Turbine Co., N. Clinton Ave., Trenton, N. J.
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Gears & Forgings, Inc., Cleveland, Ohio.
Grant Gear Works, Boston, Mass.
Horsburgh & Scott Co., Cleveland, O.
James Mfg. Co., D. O., 114 W. Monroe, Chicago, Ill.
Janette Mfg. Co., 556 W. Monroe, Chicago, Ill.
Jones Fdy. & Machine Co., W. A., 16 N. Jefferson, Chicago.
Lewellen Mfg. Co., Columbus, Ind.
Nuttall Wks., of Westinghouse Elec. & Mfg. Co., McCandless Ave & Harrison St., Pittsburgh, Pa.
Morrison Machine Co., Paterson, N. J.
Primer-Bee Co., 1750 Poland Ave., Detroit, Mich.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Philadelphia Gear Works, Richmond and Tioga Sts., Philadelphia, Pa.
Smith, Winfield H., Springville, N. Y.

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Franklin Fibre Specialty Co., Wilmington, Del.
General Electric Co., Schenectady, N. Y.
Mechart Co., St. Louis, Mo.
Micarta. See Westinghouse Elec. & Mfg. Co.
National Vulcanized Fibre Co., Wilmington, Del.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
Perkins Machine & Gear Co., 125 Circuit Ave., Springfield, Mass.
Stahl Gear & Machine Co., 1390 E. 40th, Cleveland, Ohio
Stranahan Gear Co., Frederick & Valletee, Philadelphia, Pa
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Textolite. See General Electric Co.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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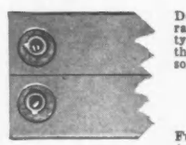

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Grant Gear Works, Boston, Mass.
James Mfg. Co., D. O., 114 W. Monroe, Chicago, Ill.
Mediart Co., St. Louis, Mo.
Meisel Press Mfg. Co., 944 Dorchester Ave., Boston, Mass.
Ohio Gear Co., 1336 E. 179th, Cleveland, Ohio.
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Peol Steel Gear & Pinion Co., Cincinnati, Ohio.

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Syracuse Rawhide Mfg. Co., Syracuse, N. Y.
Western Rawhide & Belting Co., Milwaukee, Wis
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GLASS BULBS. See Bulbs, Glass.
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Bienenfeld Glass Wks., Inc., 1539 Covert, Brooklyn, N. Y.
Bostock Rhoades & Co., 11 N. Moore, New York, N. Y.
Chesler & Sons, J., 45 Varick Ave., Brooklyn, N. Y.
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Eagle Mfg. Co., Wellsburg, W. Va.
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Perfection Glass Co., Star City, W. Va. "Oplex."
Phoenix Glass Co., Monaca, Pa. "Ivory," "Magnolia," "Radiant."
Plaut & Co., L., 432 E. 23rd, New York, N. Y. "Beryllite."
Rawson & Evans Co., 710 Washington Blvd., Chicago, Ill.
Star Glass Co., Star City, W. Va.
Steimer, Doran & Rowe, 336 Fourth Ave., Pittsburgh, Pa. "Radax."
United Novelty Glass Mfg. Co., 121 Prince, New York, N. Y.
Wells Glass Co., Kokomo, Ind. "Daylite."
Williamsburg Flint Glass Co., 290 Broadway, New York.
Zanesville Mould Co., Zanesville, O.

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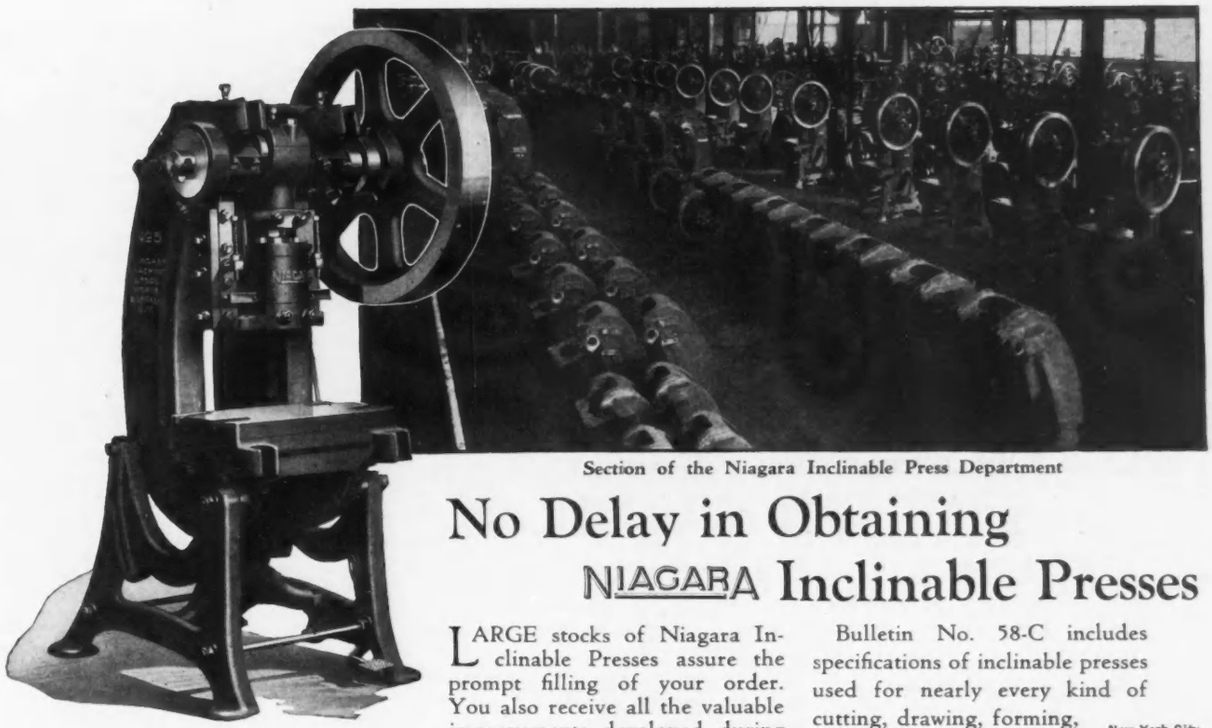
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
East Hampton Bell Co., East Hampton, Conn.
Gong Bell Mfg. Co., East Hampton, Conn.
Hill Brass Co., M. N., East Hampton, Conn.
Liberty Bell Mfg. Co., Minerva, O.
Reiter, G. C., Canton, O.
GRAPHITE BEARINGS. See Bearings, Oil-less.
GREASE CUPS. See Cups, Grease.
GRID LEAKS. See Radio Circuit Components.
GRIDS, Resistance. See Units, Rods and Grids.
GRILL CLOTH. See Cloth, Untreated.
GRINDERS, Commutator. See Tools, Commutator Truing.
GROMMETS. See Eyelets.
GROUND LOCATORS. See Instruments, Portable and Switchboard; also Testers, Coil.
GROWLERS, Armature. See Testers, Coil.
GUARDS, FAN. See Forms, Wire.

HANDLES, Wood; For Switches or Sad Irons

Allen, Chas. E., Pequabuck, Conn.
American Enamel Co., 20 Neville, Providence, R. I.
Bogert & Hopper, 225 Varick, New York, N. Y.
Estes & Son, E. B., 5844 Grand Central Terminal Bldg. New York, N. Y.
Fitchburg Enamel Co., Fitchburg, Mass.
Flanders Hardware Co., North Weare, N. H.
Fuller, J. J. Westfield, Mass.
Narragansett Mach. Co., Pawtucket, R. I.
National Wood Process, New Bedford, Mass.
Novelty Turning Co., Norway, Me.
Ober Mfg. Co., Chagrin Falls, O.
Pitcairn Mfg. Co., 5401 Hamilton Ave., Cleveland, O
Piqua Handle & Mfg. Co., Piqua, Ohio.
Royal Enamel Co., Fitchburg, Mass.
Schutz Bros., 152 Chambers, New York, N. Y.
Stiles & Co., H. A., 174 Portland, Boston, Mass.
Stratton Mfg. Co., Stratton, Maine.
Strombeck-Becker Mfg. Co., Moline, Ill.
Sun Enamel Wks., Leominster, Mass.

HEATERS, Industrial

Beckwith Machine Co., 402 Chestnut, Ravenna, O.
Hold-Heet. See Russell Electric Co.
Russell Electric Co., 384 W. Huron, Chicago, Ill.
Sta-Warm. See Beckwith Machine Co.



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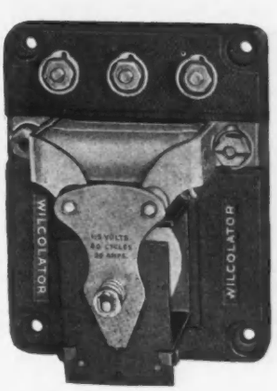

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HOT WIRE METERS. See Instruments, Portable and Switchboard.
IMPREGNATING COMPOUNDS. See Wax and Compounds.
IMPREGNATING, VACUUM. See Ovens, Industrial.
INCANDESCENT LAMP BULBS (Unfinished). See Bulbs, Glass.
INCANDESCENT LAMP FILAMENTS. See Filaments, Incandescent Lamp.

INDICATORS, Operation

Operation and Cost Indicators for Manager's Office.
Bristol Co., Waterbury, Conn. (Elapsed Time Recorder.)
Electric Indicator Corp., Stamford, Conn.
Elinco. See Electric Indicator Corp.
INDUCTION COILS. See Coils, Finished.
INSTRUMENT, Jewels. See Jewels.
INSTRUMENTS, Laboratory Standard. See Instruments, Laboratory Standard.
INSTRUMENTS, Portable Testing. See Instruments, Portable and Switchboard: also Instruments, Pocket.

INSTRUMENTS, Laboratory Standard

Argco Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Beck Bros., 421 Sedgley Ave., Philadelphia, Pa.
Biddle, James G., 1209 Arch, Philadelphia, Pa.
Burt, R. C., 347 Michigan Ave., Pasadena, Cal. (Oscilloscopes.)
Cambridge Instrument Co., Grand Central Terminal Bldg., New York, N. Y.
Chicago Apparatus Co., 1735 N. Ashland Ave., Chicago, Ill.
Delta-Star Elec. Co., 2437 Fulton, Chicago, Ill.
Eppley Laboratory, Newport, R. I. (Standard Cells.)
Fahy. See Rubicon Co.
General Electric Co., Schenectady, N. Y.
Gray Instrument Co., 64½ W. Johnson, Philadelphia, Pa.
Hickok Elec'l Instrument Co., 10514 Dupont, Cleveland, O.
Jagabi. See Biddle, James G.
Jewell Elec'l Instrument Co., 1650 Walnut, Chicago, Ill.
Kasson. See Rawson Elec'l Instrument Co.
Kelvin. See Leeds & Northrup Co.
Kohlrausch. See Leeds & Northrup Co.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Milvay. See Chicago Apparatus Co.
Omino. See Westinghouse Electric & Mfg. Co.
Rawson Elec'l Instrument Co., Cambridge, Mass.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Rubicon Co., 23 N. Sixth, Philadelphia Pa. (Wheatstone Bridges, Galvanometers, Inductance Condensers, Potentiometers, Resistance Boxes, Permeameters.)
Shallcross Mfg. Co., Collingdale, Pa.
Simplex. See Leeds & Northrup Co.
Strobatchy. See Argco Laboratories, Inc.
Stromberg Electric Co., 223 W. Erie, Chicago, Ill.
Thompson-Levering Co., 351 N. 57th St., Philadelphia, Pa.
Unipivot. See Rawson Elec'l Inst. Co.
Vreeland Apparatus Co., 140 Cedar, New York, N. Y. (Sine Wave Oscillators.)
Westinghouse Electric & Mfg. Co., Newark, N. J.
Weston Elecl. Instrument Corp., 583 Frelinghuysen Ave., Newark, N. J.

INSTRUMENTS, Pocket

Beyer Products Co., 197 Grove, Bloomfield, N. J.
Ideal Instrument Co., Penacook, N. H.
Jewell Elec. Instrument Co., 1650 Walnut, Chicago, Ill.
Kellogg Switchboard & Supply Co., 1066 W. Adams, Chicago, Ill.
Lundquist Tool & Mfg. Co., Worcester, Mass.
Readrite Meter Works, 7 College Ave., Bluffton, Ohio.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Shire Elec. Products Co., Marquette Bldg., Detroit, Mich.
Sholder-Excel Mfg. Co., Clyde, Ohio.
Square D Company, Detroit, Mich.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio.
Weston Elecl. Instrument Corp., 583 Frelinghuysen Ave., Newark, N. J.
Wigginton. See Square D Company.
Yankee. See Lundquist Tool Mfg. Co.

INSTRUMENTS, Portable and Switchboard

This heading includes all standard, portable and switchboard types, measuring and testing instruments—ammeters, voltmeters, wattmeters, ohmmeters, cable testers and fault-finders.

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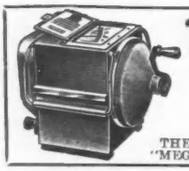
Biddle, James G., 1209 Arch, Philadelphia, Pa.
Bristol Co., Waterbury, Conn.
Brown Instrument Co., Wayne and Windrim Sts., Philadelphia, Pa.
Cambridge Instrument Co., Grand Central Terminal, New York, N. Y.
Century Elecl. Co., 100 Randall Ave., Syracuse, N. Y.
Dongan Electric Mfg. Co., 2985 Franklin, Detroit, Mich.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa.
Edison Lamps Works of G. E. Co., (Nela Park) Cleveland,
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O.
Radio Condenser Test Set.)
Electric Mfg. Co., 966 Mission, San Francisco, Cal.
Esterline-Angus Co., Speedway, Indianapolis, Ind.
Elna Elec. Wks., 410 E. 15th, New York, N. Y.
Fidelity Electric Co., Lancaster, Pa.
Fisher. See Leeds & Northrup.
Fore Elecl. Mfg. Co., 5255 Wabash Ave., St. Louis, Mo.
Freyn Engrg. Co., 310 S. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
General Radio Co., 30 State, Cambridge, Mass.
Gray Instrument Co., 64½ W. Johnson, Philadelphia, Pa.
Ground-Ohmer. See Sticht & Co.
Handy. See Weinberg & Co.
Heyer Products Co., 197 Grove, Bloomfield, N. J.
Hickok Elecl. Inst. Co., 10514 Dupont, Cleveland, O.
Hoyt Elecl. Inst. Wks., 857 Boylston, Boston, Mass.
I T L. See Illinois Testing Laboratories.
Jewell Elec'l Instrument Co., 1650 Walnut, Chicago, Ill.
King. See Electric Heat Control Co.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Master. See Jewell Elecl. Instrument Co.
M. D. C. See Metropolitan Devices Corp.
Megger. See Biddle.
Metropolitan Devices Corp., 1250 Atlantic Ave., Brooklyn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Norton Elecl. Inst. Co., 81 Hilliard, Manchester, Conn.
Paneltest Meters. See Beede Instrument Co.
Paragon Megohmer. See Sticht & Co., H. H.
Peerless Meters. See Thompson-Levering Co.
Pier Equipment Mfg. Co., Benton Harbor, Mich.
Pin-Jack. See Weston Elec'l Instrument Co.
Price Hollister Co., Rockford, Ill.
Queen. See Gray Instrument Co.
Rawson Elecl. Inst. Co., Cambridge, Mass.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Sangamo Elec. Co., Springfield, Ill.
Shortfinder. See Eisemann Shortfinder Co.
Standco. See Sticht Co., H. H.
States Co., Hartford, Conn.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, Ohio
Stewart Bros., Ottawa, Ill.
Sticht & Co., H. H., 13 Park Row, New York, N. Y.
Tanner Engrg. Co., Rawson St. and Nelson Ave., Long Island City, N. Y.
Test-A-Bat. See Beede Instrument Co.
Thomspon-Levering Co., 351 N. 57th, Philadelphia, Pa.
Thomson. See General Electric Co.
Triplex Meters. See Roller-Smith Co.
3 in 1. See Sticht & Co., H. H.
Two-in-One. See Stitcht Co., Herman H.
United States Gauge Co., 44 Beaver, New York, N. Y.
Utility. See Esterline-Angus Co.
Westinghouse Electric & Mfg. Co., Newark, N. J.
Weston Elecl. Instrument Corp., 583 Frelinghuysen Ave., Newark, N. J.

INSULATION (Insulators)

Beads. See Beads, Insulating.
Canopy. See Insulators, Canopy.
Cloth. See Cloth & Paper.
Composition. See Molded Insulation.
Compound. See Wax and Comp.
Cutters. See Strippers, Wire.
Fibre. See Fibre.
Lava. See Cores, Resistance Coil.
Marble. See Slate.
Mica. See Mica.
Molded. See Molded Insulation.
Paint. See Paint, Varnish, Lacquer.
Paper. See Cloth and Paper Insulating.
Phenolic. See Fibre, Phenol. Also Molded Insulation.
Porcelain. See Porcelain.
Rod. See Rubber, Hard.
Rubber. See Rubber, Hard.
Sealing Wax. See Wax and Compounds.
Slate. See Slate.
Soapstone. See Soapstone.
Tubing. See Tubing, Varnished Fabrics.
Varnish. See Paint and Varnish.
Wax. See Wax and Compounds.

INSULATING MACHINES, WIRE. See Wire Manufacturing Machines.
INSULATING TUBING. See Tubing, Varnished Fabric; also Tubing, Rubber.

INSULATION MIXERS

Baker Perkins Co., Saginaw, Mich.

INSULATION SHEARS. See Shears, Insulation.
INSULATION STRAINING MACHINES. See Wire Manufacturing Machines.
INSULATION TESTERS. See Instruments, Laboratory Standard.

INSULATORS, Canopy

Continental-Diamond Fibre Co., Newark, Del.
Franklin Fibre Specialty Co., Wilmington, Del.
General Electric Co., Schenectady, N. Y.
Macallen Co., Macallen & Foundry, Boston, Mass.
Wilmington Fibre Specialty Co., Wilmington, Del.

IRON CASTINGS. See Castings, Gray Iron.
IRONS, Soldering. See Soldering Irons.
JACKS, Armature. See Lifts, Armature.
JACKS, Radio. See Radio Receiver Parts.

JARS, Battery, Glass

For Composition Jars. See Molded Insulation; also Rubber.

Corning Glass Co., Corning, N. Y.
Cumberland Glass Mfg. Co., Bridgeton, N. J.
Gaynor Glass Works, Salem, N. J.
Gillinder & Sons, Inc., Philadelphia, Pa.
Hazel-Atlas Glass Co., Wheeling, W. Va.
Macbeth-Evans Glass Co., Charleroi, Pa.
Rodefer Glass Co., 21st, Bellaire, O.
Sneath Glass Co., Wabash Ave., Hartford City, Ind.
United States Glass Co., 9th & Bingham, Pittsburgh, Pa.

JEWELS, Instrument Bearing

Bird, Richard H., Waltham, Mass.
Dalmatel & Sons, J. A., Queens Village, N. Y.
Eastern Specialty Co., 3551 N. Fifth, Philadelphia, Pa.
Fisher, Thomas E., Penacook N. H.
Gatti, Inc., Aurele M., Liberty St. & Fairmount Ave. Trenton, N. J.
Mildrum Jewel Co., East Berlin, Conn.
Moser Jewel Co., 367 Division, Perth Amboy, N. J.
Sapphire Products Co., 51 Chambers, New York, N. Y.
Universal. See Oeffinger, J. L.
Wennstrom's Sons Co., John, Suffern, N. Y.
Worley Jewel Co., John, Waltham, Mass.

JOINTS, Fixture Insulating

Appleton Elec. Co., 1703 Wellington Ave., Chicago, Ill.
Macallen Co., Macallen & Foundry, Boston, Mass.
Sandow Tool Co., 1440 Broadway, New York, N. Y.
Sprecher Mfg. Co., P. W., 3300 North Ave., Milwaukee.
White Co., O. C., 15 Hermon, Worcester, Mass.
Wittenberg Bros., 60 Shipman, Newark, N. J.

LABORATORY (Laboratories.)

Ovens. See Ovens, Industrial & Laboratory.
Rheostats. See Rheostats.
Testing. See Testing.

LABORATORY STANDARD INSTRUMENTS. See Instruments, Laboratory Standard.
LACQUER, ARMATURE. See Paint, Varnish and Lacquer Metal. See Paint, Varnish and Lacquer.
LAMINATIONS. See Discs, Armature.
LAMP BASES. See Base, Reading Lamp.
LAMP BULBS (Unfinished). See Bulbs, Glass.
LAMP FILAMENTS. See Filaments, Incandescent Lamp.
LAMP LEAD-IN WELDS. See Filaments, Incandescent Lamp.
LAMP MAKING MACHINES. See Machines, Lamp Making.
LAMP TESTING PHOTOMETERS. See Photometers, Lamp.

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Weidenroff, Joseph, 4352 Roosevelt Rd., Chicago, Ill.

LAVA. See Cores, Resistance Coil.

LEAD

American Lead Co., 3112 Penn Ave., Pittsburgh, Pa.
Columbia Smelting & Refining Wks., 365 West, New York, N. Y.
Federated Metals Corp., 233 Broadway, New York, N. Y.
Jacobson & Son Co., I. M., 15304 Idaho, Detroit, Mich.
National Lead Co., 111 Broadway, New York, N. Y.
United Metals Selling Co., 25 Broadway, New York, N. Y.

LEAD-IN WELDS, Lamp. See Filaments, Incandescent Lamp.
LEADS, FLEXIBLE (Commutator Brush). See Brushes.

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Electric Power Equipment Corp., 412 W. 18th, Philadelphia, Pa.
Elpeco. See Electric Power Equipment Corp.
Goerz American Optical Co., C. P., 317 E. 34th, New York.
Jefferson Glass Co., Follansbee, W. Va. (Sign and Flashlight.)
Kliegl Bros. Universal Stage Ltg. Co., 321 W. 50th, New York, N. Y. (Condensing and Projector.)
Macbeth Evans Glass Co., Charleroi, Pa. (Flashlight.)
North Light Corp., 30 W. 18th, New York, N. Y.
Popper & Sons, Leo, 147 Franklin, New York, N. Y.
Pyle National Co., 1334 N. Kostner Ave., Chicago, Ill.
Rochester Glass Products, Inc., 29 N. Water, Rochester, N. Y.
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Sneath Glass Co., Wabash Ave., Hartford City, Ind. (Sign.)
Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y.

LETTERS, Sign

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Grammes & Sons, Inc., L. F., Allentown, Pa.

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Columbia Machine Works & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Duff-Norton Mfg. Co., Pittsburgh, Pa.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.
Ridlon Company, Frank, Boston, Mass.

LININGS, Socket

Remington Mfg. Co., 937 Barnum Ave., Bridgeport, Conn.

LOCK WASHERS. See Washers, Lock.
LOOP WINDERS & SPREADERS. See Winding Machines, Armature & Field Coil.
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Boudette Mfg. Co., 67 Crescent Ave., Chelsea, Mass.
Brooklyn Metal Stamping Corp., 730 Atlantic Ave., Brooklyn, N. Y. (Electric Pick-up.)
Cannonball. See Cannon & Miller Co.
Cannon & Miller Co., Springwater, N. Y.
Chelten Electric Co., 4859 Stenton Ave., Philadelphia, Pa.
Conamic. See Operadio Mfg. Co.
Decatur Mfg. Co., 45 Harman St., Brooklyn, N. Y.
Detroit Reproducers, Inc., Lafayette & Meldrum Sts., Detroit, Mich.
Duo-Lac. See F. & H. Radio Laboratories.
Dynola. See Utah Radio Products Co.
Electrical Research Laboratories, 2500 Cottage Grove Ave., Chicago, Ill. (Units.)
Empire United Hat Block Co., 312 E. 22nd, New York.
Fence Cone Co., 57 Murray, New York, N. Y. (Kit.)
Fidelity Radio Corp., Salt Lake City, Utah.
F. & H. Radio Laboratories, Fargo, N. D.
General Illuminating Co., 1101 Ocean P'kway, Brooklyn, N. Y.
Globe Technolian Corp., Reading, Mass.
G. R. P. See Penn Mfg. Co.
Jack Horner. See Operadio Mfg. Co.
Jensen Radio Mfg. Co., 6601 S. Laramie Ave., Chicago, Ill.
Kersten Radio Equipment, Inc., 1415 Fielford, Kalamazoo, Mich.
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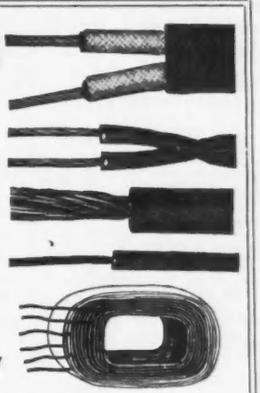

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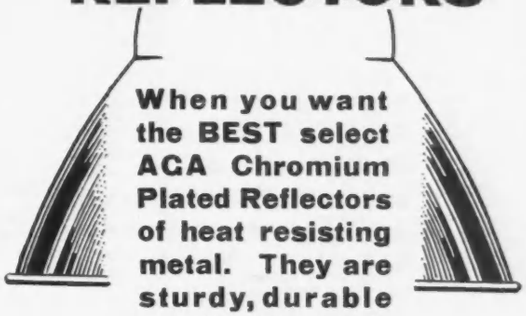

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Philco. See Philadelphia Storage Battery Co.
Platter Cabinet Co., North Vernon, Ind.
Powerola. See Temple Mfg. Corp.
Puropower. See Platter Cabinet Co.
Quam Radio Products Co., Div. of United Air Cleaner Corp., 9705 Cottage Grove Ave., Chicago, Ill.
Racon Elec. Co., 18 Washington Place, New York, N. Y. (Horn only.)
Red Lion Cabinet Co., Red Lion, Pa.
Sonochorde. See Boudette Mfg. Co.
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Utona. See American Radio Products Corp.
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LUGS, Copper

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Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

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KEY

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Pendants (Bulbs) .....See P
Standard Parts .....See S

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Connecticut Elec. Mfg. Co., Bridgeport, Conn..... S ..
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis.
Eagelite. See Eagle Elec. Mfg. Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y... .. .. P
General Elec. Co., Merchandise Dept., Bridgeport, Conn. ..... S P ..
Glo-Guide. See Bryant Elec. Co.
Glow Lite. See Radale Mfg. Co.
Hubbell, Inc., Harvey, Bridgeport, Conn..... .. P
Luma & Luma Lite. See Radium Dial Co.
National Appliance Co. (Div. of Reynolds Spring Co.), Jackson, Mich. .... S ..
Radieye. See General Electric Co.
Radium Dial Co., 3533 Forbes, Pittsburgh, Pa.... C .. P
Radale Mfg. Co., 200 Hudson, New York, N. Y..... .. P
Reeflis. See T. C. Smith & Co.
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia .. P
Undark. See United States Radium Corp. and Bryant Elec. Co.
United States Radium Corp., 535 Pearl, New York, N. Y. ..... C S P
MACHINE SCREWS. See Screws, Machine.
MACHINE SCREW PRODUCTS. See Screw Machine Products.

MACHINES

Armature Banding. See Banding Machines, Armature
Armature Notching. See Notching Machines, Armature
Balancing. See Balancers, Armature.
Banding. See Banding Machines, Armature.
Cable Armoring. See Wire Manufacturing Machines.
Coil Shaping. See Shaping Machines, Coil.
Coil Taping. See Taping Machines, Coil.
Coil Winding. See Winding Machines.
Commutator Slotting. See Mica Undercutters.
Engraving. See Engraving Machines.
Incandescent Lamp Making. See Machines, Lamp Making
Molded Insulation. See Presses, Molded Insulation.
Perforating. See Perforating Machines.
Porcelain Molding. See Presses, Porcelain Molding.
Radio Tube. See Machines, Lamp Making.
Shaping. See Shaping Machines, Coil.
Slotting. See Mica Undercutters.
Soldering. See Soldering Machines, Commutator.
Spring Making. See Spring Making Machines.
Taping. See Taping Machines, Coil.
Tension. See Tension Machines, Band Wire.
Winding. See Winding Machines.
Wire, Armoring. See Wire Manufacturing Machines.
Wire Drawing. See Wire Drawing Machinery.
Wire Insulator. See Wire Manufacturing Machines.
Wire Measuring. See Wire Manufacturing Machines.
Wire Tension. See Tension Machines, Band Wire.
Wire Wrapping. See Wire Wrapping Machines.

MACHINES, Lamp Making

For Making Incandescent Lamps and Vacuum Tubes.
Argeo Laboratories, Inc., 150 W. 22nd, New York, N. Y.
Arrow Mfg. & Machine Co., North Bergen, N. J.
Berrenberg, R., 12 Farnham (Roxbury), Boston, Mass (Vacuum Pumps.)
Czerwenka, Frank, 35 Monroe, Passaic, N. J. (Bombarding Machines.)
Eisler Electric Corp., 770 S. 13th, Newark, N. J.
General Engineering & Supply Co., 160 5th Ave., New York N. Y. (Filament Winder.)
Geaco. See General Engineering & Supply Co.
International Machine Wks., 527 32nd, Union City, N. J.
Rhasen Mfg. Co., 124 45th, Union City, N. J.
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York Elec. & Machine Co., 30 Penn, York, Pa.

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MACHINES, Spring Making. See Spring Making Machines
MACHINES, WIRE MANUFACTURING. See Wire Manufacturing Machines.
MAGNET CHARGERS. See Chargers, Magnet.
MAGNET STEEL. See Steel, Magnet.
MAGNET TESTERS. See Instruments, Portable and Switchboard; also Instruments, Pocket.
MAGNET WIRE MACHINES. See Enameling Machines for Magnet Wire.
MAGNETIC CHUCKS. See Chucks, Magnetic.
MAGNETIC CLUTCHES. See Clutches, Magnetic.

MAGNETS, Lifting

Ohio Elec. Mfg. Co., 5905 Maurice Ave., Cleveland, O.
MAGNETOMETERS. See Instruments, Pocket.

MAGNETS, Permanent

Bulleas Co., D. K., Pottstown, Pa.
Ind. Steel Products Co., 4545 S. Western Blvd., Chica.
Rogers Drop Forging Co., Worcester, Mass.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.

MALLETS, Raw Hide

Chicago Rawhide Mfg. Co., 1287 Elston Ave., Chicago, Ill.
Crude Pelt. See Chicago Rawhide Mfg. Co.
Garland Mfg. Co., Saco, Me.
Holbrook Raw Hide Mfg. Co., 748 N. Main, Providence, R. I.
MANGANESE, Battery. See Chemicals, Battery.

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Schmidt, Inc., Geo. T., 4102 Ravenswood Ave., Chicago, Ill.
MEASURING INSTRUMENTS. See Instruments.
METAL CUTTING OUTFITS. See Welding and Cutting
MECHANICAL RUBBER GOODS. See Rubber Mechanical Goods.
MEGOHMMETERS. See Instruments, Laboratory Standard

MELTING POTS AND LADLES, SOLDER, ETC.

Dunco. See Struthers Dunn, Inc.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
MERCURY SWITCHES. See Switches, Mercury.
METAL CLEANERS (Compound). See Cleaners, Metal.
METAL FINISHING. See Plating & Finishing.
METAL MARKING OUTFITS. See Engraving Machines.
METALLIC SHADES. See Shades, Metallic.
METERS. See Instruments.
MICA SHADES. See Shades, Mica.
MICA TAPE. See Tape, Mica.
MICA UNDERCUTTERS. See Slotting Machines & Tools. Commutator.

MICA

Asheville Mica Co., Biltmore, N. C.
Asco. See Schoonmaker Insulation Co.
Brand & Co., William, 268 Fourth Ave., New York, N. Y.
Chicago Mica Co., 345 Campbell, Valparaiso, Ind.
Colonial Mica Co., 136 Seventh, Jersey City, N. J.
Ford Radio & Mica Corp., 113 Bleecker, New York, N. Y.
Gerdau Co., Otto, 533 Canal, New York, N. Y.
Gillespie-Rogers-Pyatt Co., Inc., 99 John, New York, N. Y.
Hirsch Mica Co. 1087 Flushing Ave., Brooklyn, N. Y.
Hoyt, Inc., Philip S., Los Tablos, New Mexico.
Huse-Liberty Mica Co., 73 Long Wharf, Boston, Mass.
International Mica Co., 3660 Brandywine, Philadelphia, Pa
Kant Krack. See Huse Liberty Mica Co.
Keene Mica Co., Keene, N. H.
Macallen Co., Macallen & Foundry, Boston, Mass.
Micabond. See Chicago Mica Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Miralite. See Mitchell-Rand Mfg. Co.

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Munsell & Co., Eugene, 200 Varick, New York, N. Y.
Nemco. See New England Mica Co.
New England Mica Co., Waltham, Mass.
New England Minerals, Inc., 85 Devonshire, Boston, Mass
New York Mica & Mfg. Co., Auburn, N. Y.
Peerless. See New England Mica Co.
Red Line. See Huse Liberty Mica Co. (Ground Mica.)
Red Streak. See Huse Liberty Mica Co.
Schoonmaker Insulation Co., A. O., 34 University Place, New York, N. Y.
Storrs Mica Co., 11 Park Place, New York, N. Y.
Tar Heel Mica Co., Plumtree, N. C.
Watson Bros., 170 Purchase, Boston, Mass.
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MIXERS, INSULATION. See Insulation Mixers.

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Presses. See Presses, Molded Insulation.
Radio Parts. See Radio Molded Parts.
Shades. See Molded Insulation.

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Areolite. See American Insulator Corp.
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Allen & Hills, Inc., Auburn, N. Y.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa. (Cold.)
Amblerold. See Ambler Asbestos Shingle & Sheathing Co.
American Catalin Corp., 230 Park Ave., New York, N. Y.
American Insulator Corp., New Freedom, Pa.
American Machine & Foundry Co., 5520 Second Ave., Brooklyn, N. Y.
American Record Corp., Scranton, Pa.
Amerine. See American Insulator Corp.
Auburn Button Wks., 48 Canoga, Auburn, N. Y.
Bakelite Corp., 247 Park Ave., New York, N. Y.
Bay State Moulding Co., 1197 Dorchester Ave., Boston.
Beatsol Corp., 226 Hillside Ave., Hillside, N. J.
Belden Mfg. Co., 4633 W. Van Buren, Chicago, Ill.
Bell Mfg. Co., 11 Elkins, Boston, Mass. Radio Parts.
Bettle. See Synthetic Plastics Co., Inc.
Boonton Molding Co., 300 Myrtle Ave., Boonton, N. J.
Boonton Rubber Mfg. Co., 223 Fanny Rd., Boonton, N. J.
Celluloid Corp., 10 E. 40th, New York, N. Y.
Cepco. See Monowatt Corp.
Cetec. See Monowatt Corp.
Cetelite. See Monowatt Corp.
Chirock. See Colt's Patent Firearms Mfg. Co.
Chicago Molded Products Co., 2144 Walnut, Chicago, Ill
Cincinnati Molding Co., 2037 Florence Ave., Cincinnati, O
Colasta Co., Hoosick Falls, N. Y.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Compo-Site, Inc., 207 Astor, Newark, N. J.
Condensite. See Bakelite Corp.
Connecticut Elec. Mfg. Co., Bridgeport, Conn
Continental-Diamond Fibre Co., Newark, Del.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Dayton Insulating Molding Co., 434 E. First, Dayton, Ohio.
Diemolding Corp., Canastota, N. Y.
Dimco. See Dayton Insulating Moulding Co.
Durez. See General Plastics, Inc.
Electrical Insulation Corp., 308 W. Washington, Chicago, Ill.
Electrose. See Insulation Mfg. Co.
Erinoid Co., 205 E. 42nd, New York, N. Y.
Evercool. See Bakelite Corp.
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General Moulded Composition Co., 212 Market, Lynn, Mass.
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Hemmit. See Garfield, Mfg. Co.
Herculite. See Colosta Co.
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Improco. See Insulation Products Co.
Inda. See American Machine & Foundry Co.
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Insulation Products Co., 404 Richland, Pittsburgh, Pa.
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Karolith Corp., 2125 44th Rd., Long Island City, N. Y. (Casein plastics.)
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Kellogg Switchboard & Supply Co., 1066 W. Adams, Chicago, Ill.
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Lacanite. See Scranton Button Co.
Luco Products Corp., 40 Flatbush Ave. Extension, Brooklyn, N. Y.
Lumarith. See Celluloid Corp.
Luxite. See Wilbur & Williams Co
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Mack Molding Co., Wayne, N. J.
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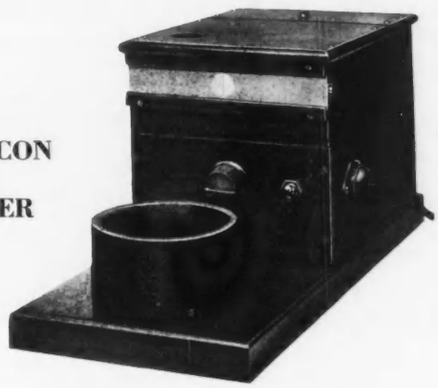

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Niagara Insul-Bake Specialty Co., 453 Delaware Ave., Albany, N. Y.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Norloc. See Norton Laboratories, Inc.
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Norton Laboratories, Inc., Div. 85, Lockport, N. Y.
Panelyte Corp., Lincoln Bldg., New York, N. Y.
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Phenolic. See Scranton Button Co.
Plastic Molding Corp., Sandy Hook, Conn. (Cold.)
Pollopas. See Wilbur & Williams.
Pruven Composition Products Corp., Milford, Conn
Pruvenite. See Pruven Composition Products Co.
Pyrolax. See Cutler-Hammer Mfg. Co.
Recto Mfg. Co., Appleton & B.&O. R.R., Cincinnati, O.
Redmanol. See Bakelite Corp.
Rexlite. See Northern Industrial Chemical Co.
Reynolite. See National Appliance Co.
Reynomold. See National Appliance Co.
Richardson Co., Lockland, Cincinnati, O.
Ridgelite. See Ridgley Trimmer Co.
Ridgley Trimmer Co., Springfield, O.
Schneider Bros., Inc., 312 N. Sheldon Ave., Chicago.
Shaw Insulator Co., Irvington, Newark, N. J.
Siemon Co., State and Dewey, Bridgeport, Conn.
Specialty Insulation Mfg. Co., Hoosick Falls, N. Y.
Star Insulate. See Insulation Mfg. Co.
Starite. See Insulation Mfg. Co.
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Stokes & Smith Co., Summerdale Ave. near Roosevelt Blvd., Philadelphia, Pa.
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Textolite. See General Elec. Co., also Electrical Insulation Corp.
Thermoplax. See Cutler-Hammer Mfg. Co.
Tegit. See Garfield Mfg. Co.
Union Insulating Co., Parkersburg, W. Va.
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Wilbur & Williams Co., 261 Park Square Bldg., Boston, Mass. (Molding Powder.)

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Fansteel Products Co., Inc., North Chicago, Ill.
Lohfeld & Co., J. L., 58 Park Place., New York, N. Y.
Mallory & Co., P. R., 329 E. Washington, Indianapolis, Ind.
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Motors, 1 Hp. up ..... See M
Motors Fractional Hp. ..... See F
Universal ..... See U

Actodector. See Roth Bros. Co., Div. of Century Electric Co
Advance Elec. Co., 4311 Maple Ave., St. Louis M F S ..
Allis-Chalmers Mfg. Co., Milwaukee, Wis. ..... M .. S ..
Allis Co., Louis, Milwaukee, Wis. ..... M .. S ..
American Elec. Motor Co., Cedarburg, Wis. ..... M .. ..
Apex Elec'l Mfg. Co., 1067 E. 152nd, Cleveland .. F S U
Armor Elec. Mfg. Co., 1200 Hilliard, Erie, Pa. M .. .. ..
Baldor Elec. Co., 4352-C Duncan Ave. St. Louis ..... M F S ..
B-Line. See Brown-Breckmeyer Co.
Bodine Elec. Co., 2254 W. Ohio, Chicago ..... F S U
Bogue Elec. Co., Chas. J., 142 Nassau, New York M .. .. ..
Brown-Breckmeyer Co., Norwood Power Bldg., Dayton, O. ..... M F .. ..
Burke Elec. Co., Erie, Pa. ..... M F S U
B. T. See Allis Co., Louis.
B & R Mfg. Co., 812 Lafayette, Toledo, O. .... F .. ..
Century Elec. Co., 1806 Pine, St. Louis, Mo.. M F S ..
Chandeysson Elec. Co., St. Louis, Mo. ..... M .. S ..
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Cushman Elec. Co., 69 S. Main, Concord, N. H. M F S ..
Diehl Mfg. Co., Elizabeth, N. J. ..... M F S ..
Diverter Pole. See Rochester Elec. Product Co.
Domestic Electric Co., Kent, O. ..... S U
Dumore Co., 35 16th, Racine, Wis. ..... F .. U
Edco. See Electro Dynamic Co.
Electric Machinery Co., Minneapolis, Minn.. M .. S ..
Electric Products Co., 1725 Clarkstone Rd., Cleveland, O. ....
Electric Specialty Co., 221 South Stamford, Conn. M F S U
Electro Dynamic Co., Bayonne, N. J. ..... M .. S ..
Emerson Electric Mfg. Co., 2015 Washington Ave., St. Louis, Mo. ..... M F S U
Esco. See Electric Specialty Co.
Fairbanks-Morse & Co., 900 S. Wabash Ave., Chicago, Ill. ..... M F .. ..
Fidelity Elec. Co., Lancaster, Pa. ..... M F S U
Fitzgerald Mfg. Co., Torrington, Conn. ..... F .. ..
Fynn Weichsel. See Wagner Elec. Corp.
Galvin Elec. Mfg. Co., 3314 S. Broadway, St. Louis, Mo. ..... F S ..
General Electric Co., Schenectady, N. Y. ..... M F G ..
Gilbert Co., A. C., New Haven, Conn. ..... F U
Hamilton Beach Mfg. Co., Racine, Wis. ..... F S U
Hobart Bros. Co., Troy, O. ..... M .. S ..
Holtzer-Cabot Elec. Co., 125 Amory, Boston... M F S ..
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Imperial Electric Co., Akron, O. ..... M .. S ..
Janette Mfg. Co., 556 W. Monroe, Chicago... .. F S ..
Janz & Leist Elec. Co., Western Ave. & York, Cincinnati, O. ..... M F .. ..
Kendrick & Davis Co., Lebanon, N. H. ..... F S ..
Kimble Elec. Co., 634 N. Western Ave., Chicago M .. S U
Leland Elec. Co., Dayton, O. ..... F S ..
L. E. See Leland Elec. Co.
Lincoln Elec. Co., Cleveland, Ohio ..... M .. S ..
Linc-Weld. See Lincoln Elec. Co.
Linzee Elec. Motor Co., Mansfield, O. ..... M .. .. ..
Mando Co., 911 State Tower Bldg., Syracuse, N. Y. (6-12-40 Volt only) ..... F .. ..
Marathon Elec. Mfg. Co., 32 Island, Wausau, Wis. .. F .. ..
Marble-Card Elec. Co., Gladstone, Mich. ..... M .. .. ..
Master Electric Co., Dayton, O. ..... M F S ..
MC. See General Electric Co.
Michigan Elec. & Mfg. Co., Lake Linden, Mich. .. F S ..
Norfolk. See Walter Elec. Mfg. Co.
North East Appliance Corp., 379 Lyell Ave., Rochester, N. Y. ..... F .. U
Northwestern Mfg. Co., 480 Clinton, Milwaukee M .. .. ..
Ohio Elec. Mfg. Co., 5905 Maurice Ave., Cleveland, Ohio ..... F S ..
O. K. See Marathon Elec. Mfg. Co.
Onanu Co., F., 245 Seventh Ave., New York M .. .. ..
Peerless Elec. Co., 740 W. Market St., Warren, O. M F S U
Polar Cub. See Gilbert Co., A. C.
Pow-R-Full. See Wagner Elec. Corp.
Reco. See Reynolds Electric Co.
Red Band. See Howell Elec. Motors Co.
Reliance Elec. & Engrg. Co., 1042 Ivanhoe Rd., Cleveland, O. ..... M .. S ..
Reynolds Electric Co., 2650 W. Congress, Chicago .. F S ..
Robbins & Myers Sales, Inc., Springfield, O. M F S U
Roth Bros. & Co., Div. of Century Elec. Co., 1400 W. Adams, Chicago, Ill. ..... M F S ..
Standard. See Robbins & Myers Co.
Star Elec. Motor Co., Miller St. & N. J. R. R. Ave., Newark, N. J. ..... M .. S ..
Sterling Elec. Motors, Inc., Telegraph Rd. and Atlantic Blvd., Los Angeles, Cal. ..... M .. S ..
Stow Mfg. Co., Binghamton, N. Y. ..... M F S U
Sturtevant Co. (Hyde Park), Boston, Mass. .... M F S U
Sunlight Electrical Mfg. Co., Dana Ave., Warren, O. ..... F S ..
Super Wick. See Master Elec. Co.
Switch Start. See Lincoln Elec. Co.
Troy Engine & Machine Co., Engberg's Div., St. Joseph, Mich. ..... M .. S ..
Union Elec. Motor Mfg. Co., Hancock & Oxford Sts., Philadelphia, Pa. ..... M F S ..
U. S. Elec. Mfg. Co., 200 E. Slawson Ave., Los Angeles ..... M .. S ..
Valley Elec. Co., 4221 Forest Park Blvd., St. Louis, Mo. ..... M .. S ..
Wagner Elec. Corp., 1935 Indiana Ave., St. Louis, Mo. ..... M F S U
Walter Elec. Mfg. Co., Norfolk, Va. ..... M .. S ..
Watson. See Allis Co., Louis.
Welco Uniframe. See Wesche Elec. Co., B. A.
Wesche Elec. Co., B. A., 1622 Vine, Cincinnati M F S ..
Westinghouse Elec. Mfg. Co., East Pittsburgh M F S ..
Woods Mach Co., S. A., 27 Damrell, Boston. M F S ..
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Crowe Name Plate & Mfg. Co., 1749 Grace, Chicago, Ill.
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OSCILLOSCOPES. See Instruments, Laboratory Standard

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Paint, Insulating and Acid Proof. See P
Lacquer, Metal Finishing ..... See L

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Ajax. See Sherwin-Williams Co.
Alaka. See Lacquer & Chemical Corp.
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Arizona Lacquer Mfg. Co., 7 16th, Brooklyn, N. Y. ... L
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DISCS are sawed from rods instead of being punched from sheets. Thus, Fansteel contact points have *end grain* metal exposed to wear. Result:—a hard, smooth, uniform surface that resists heat and wear, and does not readily stick, pit or flake off.

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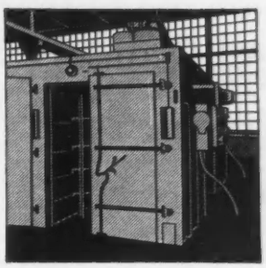

A Good Oven Serves Many Purposes

BECAUSE the quality of oven dried insulation depends so largely on the manner of its baking and the accurate control of both baking time and baking temperatures, a correctly built oven for coil and armature work has come to be regarded as an essential.

But the same oven can also be utilized to reduce the cost of finishing motor frames, end bells, control box covers, switch boxes and any number of other metal parts used in connection with electrical apparatus. Such parts can be dipped and baked more rapidly and cheaper than they can be sprayed and air dried. And the baked finish will be more durable.

The oven is also a valuable asset in the pre-heating of deep coils, in driving off all moisture and opening the pores of the wire covering, preparatory to dipping the coil in insulating varnish.

Again, the oven can be employed to burn off old insulation in the handling of repair work. Or it may be used to bake lamination varnish.

And another use for the oven is that of baking articles made of molded materials such as insulators or special insulating elements used in assembling electrical machinery.

A good oven will rapidly pay for itself by shortening up production operations, reducing operating labor and increasing product quality and uniformity.

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Surefit. See Alco Mfg. Co.
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Triple Tap. See General Elec. Co.
Twin Tap. See General Elec. Co.
United States Elec. Mfg. Co., 222 W. 14th, New York.
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Weber. See Sears, Henry D.
Wellmade Elec. Mfg. Co., Terrington, Conn.
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Yankee. See Beaver Mfg. Co.
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Cohn, Sigmund, 44 Gold, New York, N. Y. (Platinum.)
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Fansteel Products Co., North Chicago, Ill.
General Plate Co., Attleboro, Mass.
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Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Interstate Products Corp., 503 Mulberry, Newark, N. J. (Platinum and Silver.)
Mallory & Co., P. R., 329 E. Washington, Indianapolis, Ind.
National Contact Co., 33 W. 60th, New York. (Platinum.)
Spark-O-Metal. See Hardy Metal Corp.
Tungsten Electric Corp., 545 39th, Union City, N. J.
Wilco. See Wilson Co., H. A.
Wilson Co., H. A., Newark, N. J. (Platinum and Silve.
POLARITY INDICATORS. See Instruments, Pocket.
POLISHING MACHINES, WIRE. See Wire Polishing Machines.

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Beads. See Beads, Insulating.
Bushings. See Bushings, Box & Cabinet.
Cement. See Cement, Liquid, Porcelain.
Insulators. See Porcelain.
Liquid. See Cement, Liquid Porcelain.
Molding Machine. See Presses, Porcelain Molding.
Reflectors (Enameled). See Reflectors, Porcelain Enameled
Refractory. See Cores, Resistance Coil.
Tubes. See Porcelain.

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Akron Porcelain Co., Akron, Ohio.
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A. P. See Akron Porcelain Co.
Burgess & Co., East Liverpool, O.
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Challenge Stamping & Porcelain Co., Grand Haven, Mich.
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Cook Pottery Co., Trenton, N. J.
Corns China Co., Wellsville, O.
Crowley & Co., 1 Centre Ave., West Orange, N. J.
Crowlite. See Crowley & Co.
Electrical Refractories Co., East Palestine, O.
Globe Porcelain Co., Mulberry St. and St. Joes Ave., Trenton, N. J.
Hartford Faience Co., Hartford, Conn.
Hub-Way Mfg. Co., Hubbard, Ohio
Illinois Electric Porcelain Co., Macomb Ill.
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Knox Porcelain Corp., Knoxville, Tenn.
Louthan Mfg. Co., East Liverpool, O.
Mercer Porcelain Co., Trenton, N. J.
Metsch Refractories Co., East Liverpool, Ohio
National Porcelain Co., Trenton, N. J.
New Jersey Porcelain Co., Trenton, N. J.
Nu Blac. See Star Porcelain Co.
Pass & Seymour, Inc., Solvay Sta., Syracuse, N. Y
Porcelava. See Burgess & Co.
Porcelain Products, Inc., Findlay, Ohio.
Square D Company, Detroit, Mich.
Standard & Specialty Porcelain Wks., Sun Prairie, Wis.
Star Porcelain Co., Muirhead Ave., Trenton, N. J.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa.
Thomas & Sons Co., R., Lisbon, O.
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Ensign. See Eby Mfg. Co., H. H.
Eureka. See Frank W. Morse Co.
Grammes & Sons, Inc., L. F., Allentown, Pa.
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King. See Morse Co., Frank W.
Morse Co., Frank W., 291 Congress, Boston. (Spring Grip.)
Nutmeg. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
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Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill.
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Waterbury Button Co. (Elecl. Mfg. Dept.), Waterbury, Conn.
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POTENTIOMETERS (Radio Control). See Radio Receiver Parts.
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Evans Engrg. Works, Chas. E., 1002 Fulton, Chicago, Ill
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French Oil Mill Machinery Co., Piqua, O.
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Camco. See American Can Co.
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Premier Electric Co., 3800 Ravenswood Ave., Chicago, Ill.
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill.

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General Electric Co., Schenectady, N. Y.
Hubbard's Sons, Norman, 1 Carlton Ave., Brooklyn, N. Y.
Megavac. See Central Scientific Co.
Packard. See Hubbard's Sons, Norman.
PUNCHING PRESSES. See Presses, Punching.

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Chapman Elec'l Wks., P. E., 1826 Chouteau Ave., St. Louis Mo. (Tensionless Dereeler)
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Comstock Mfg. Co., Wilkes-Barre, Pa.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
General Elec. Co., Schenectady, N. Y. (Tension Indicator.)
Mutual Foundry & Machine Co., Atlanta, Georgia.
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Ajax Elec. Specialty Co., 1926 Chestnut, St. Louis, Mo.
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Alden Mfg. Co., Brockton, Mass.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
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American Transformer Co., 178 Emmet, Newark, N. J.
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Arco Elec'l Corp., 211 E. Columbia, Fort Wayne, Ind.
Arctic. See Premier Elec. Co.
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Autoformer. See Thordarson Elec. Mfg. Co.
Automatic Oil Heat Co., 9294 E. Fourth, St. Paul, Minn.
Automotive Parts Mfg. Co., 70 Washington St., Brooklyn.
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Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Beseline. See Turn-It Radio Sales
Branston Co., Chas. A., 299 Ellicott, Buffalo, N. Y.
Brooklyn Metal Stamping Corp., 718 Atlantic Ave., Brooklyn, N. Y
Browning-Drake Corp., Calvary, Waltham, Mass.
Buffer. See Aerovox Wireless Corp.
Buffalo. See De Jur-Amsco Corp.
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Capacitrad. See Pilot Radio & Tube Corp.
Cardwell Mfg. Corp., Allen D., 81 Prospect, Brooklyn, N. Y.
Carter Radio Co., 407 S. Aberdeen, Chicago, Ill.
Centraline. See Pilot Radio & Tube Corp.
Certified Condenser. See Radio Condenser Co.
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Cleveland Steel Products Corp., 7306 Madison Ave., Cleveland, O.
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Connectorstds. See Alden Mfg. Co.
Continental Carbon, Inc., 13904 Lorain, Cleveland, O.
Continental. See Gardiner & Hepburn, Inc.
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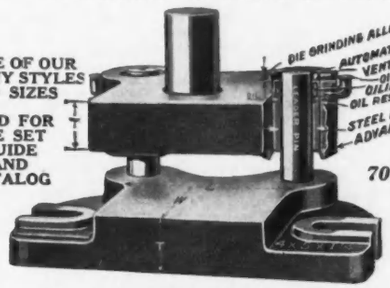

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Dumont Elec. Co., 40 W. 17th, New York, N. Y.
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Durham & Co., 1936 Market, Philadelphia, Pa.
Dynohmic. See Lynch, Inc.
Eagle Elec. Mfg. Co., 70 Hall, Brooklyn, N. Y.
Electrad, Inc., 175 Varick, New York, N. Y.
Electrical Research Laboratories, 2500 Cottage Grove Ave., Chicago, Ill.
Electro Motive Engineering Corp., 127 W. 17th, New York.
Elkay. See Langbein Kaufman Radio Co.
El Menco. See Electro Motive Engineering Co.
Equitrol. See Cardwell Mfg. Corp.
E-Z. See Polymet Mfg. Corp.
Faradon. See Wireless Specialty Apparatus Co.
Fast Co., John E., 3123 N. Crawford, Chicago, Ill.
Ferranti, Inc., 130 W. 42nd, New York, N. Y.
Filatrol. See De Jur-Amsco Corp.
Filterettes. See Tobe Deutschmann Co.
Flechtheim Co., A. M., 156 Liberty, New York, N. Y.
Ford Radio & Mica Corp., 113 Bleecker, New York, N. Y.
Frost, Inc., Herbert H., 1142 W. Beardsley, Elkhart, Ind.
Furnell Die Cast Condenser Corp., 16 Hudson, New York
F. & H. Radio Laboratories, Fargo, N. D.
Gardiner & Hepburn, Inc., 611 Widener Bldg., Philadelphia, Pa.
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General Mfg. Co., 8066 S. Chicago Ave., Chicago, Ill. (Coils.)
General Radio Co., 30 State, Cambridge, Mass.
General Transformer Corp., 910 W. Jackson Blvd., Chicago.
General Winding Co., 214 Fulton, New York, N. Y.
Gen-Win. See General Winding Co.
Ger-Alt Radio Laboratories, 859 Flatbush Ave., Brooklyn, N. Y. (Adapter.)
Glastor. See Daven Co.
Globar Corp., Niagara Falls, N. Y.
Glo-Dial. See Wireless Radio Corp.
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Hammarlund Mfg. Co., 424 W. 33rd, New York, N. Y.
Hardwick, Hindle, Inc., 216 Emmett, Newark, N. J.
Harmonik. See Karas Elec. Co.
Hedgehog Transformer. See Premier Elec. Co
Heinemann Elec. Co., Penn. Ave. & Plum, Trenton, N. J.
Hum-Dinger. See Clarostat Mfg. Co.
Hy-Wat. See Electro Motive Engineering Corp.
Igrad Condenser & Mfg. Co., 4322 Lake Ave., Rochester, N. Y.
Infra-Dyne. See Gray & Danielson Co.
International Resistance Co., 2006 Chestnut, Philadelphia, Pa.
Isograd, Isoleak. See Pilot Radio & Tube Corp.
Jefferson Electric Co., 1500 S. Laflin, Chicago, Ill.
Kenyon Transformer Co., 122 Cypress Ave., New York, N. Y.
Kilograd. See Pilot Radio & Tube Corp.
Kroblack. See Mountford, C. E.
Kuprox. See Kodel Radio Corp.
Langbein-Kaufman Radio Co., 62 Franklin, New Haven, Conn.
Lavite. See Aerovox Wireless Corp.
Lautz Mfg. Co., 245 N. J. R. R. Ave., Newark, N. J (Radio Resistance).
Leakandenser. See Daven Co.
Lekeless. See Benjamin Elec. Mfg. Co.
Lemnis. See General Winding Co.
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Loleas. See Wireless Radio Corp.
Lynch Mfg. Co., 1775 Broadway, New York, N. Y.
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Mayo Laboratories, Inc., 281 E. 137th, New York, N. Y.
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Mershon. See Amrad Corp.
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Metralign. See General Instrument Corp.
Micadon Condenser. See Dubilier Condenser Corp.
Micamold Radio Corp., 1087 Flushing Ave., Brooklyn, N. Y (Amplifier Kit.)
Mica-Static. See Dubilier Condenser Corp.
Micon Condenser. See Dubilier Condenser Corp.
Microcondenser. See Sterling Mfg. Co.
Microgrid. See Pilot Radio & Tube Corp.
Microstat. See Premier Elec. Co.
Midline. See Hammarlund Mfg. Co.
Mignon Electric Corp., 909 Genesee, Buffalo, N. Y.
Mountford, C. E., 30 Sullivan, New York, N. Y.
Muter Co., Leslie F., 8440 S. Chicago Ave., Chicago Ill. (Amplifier Kits.)
National Co., 61 Sherman St., Malden, Mass.
Neutro-Grad. See Pilot Radio & Tube Corp.
New York Coil Co., Mount Clare, Pa.
Nutmeg See Hart & Hegeman Mfg. Co
Ohio Carbon Co., 12508 Almira Ave., Cleveland, O.
Ohmite Mfg. Co., 633 N. Albany Ave., Chicago, Ill. (Resistance.)
Orthophone. See De Jur-Amsco Corp.
Pacent Electric Co., 91 7th Ave., New York, N. Y.
Sam Amplifier. See Samson Electric Co.
Panatrol See Wireless Radio Corp.
Perry Elec'l Resistor Corp., 280 New Main St., Yonkers N. Y.
Phaastrol. See Electrad, Inc.
Philmore Mfg. Co., 136 7th Ave., New York, N. Y.
Pierce Atro. See United Scientific Laboratories
Pierce Mfg. Co., 625 W. Jackson Blvd., Chicago, Ill.
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y
Pilotran See Pilot Radio & Tube Corp.
Potter Mfg. Co., North Chicago, Ill. (Electro-Chemical Condensers.)
Polymet Mfg. Corp., 829 E. 134th St., New York. N. Y
Power Box. See Scott Sales Co.
Powerohm. See International Resistance Co.
Powrad, Inc., 121 Ingraham, Brooklyn, N. Y.
Precise Mfg. Corp., 254 Mill, Rochester, N. Y.
Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill
Protectoraid. See Alden Mfg. Co.
Pyrohm. See Aerovox Wireless Corp
Radiall Co., 50 Franklin, New York, N. Y
Radio Appliance Corp., 30 Taylor, Springfield, Mass.
Radio Condenser Co., Thorn & Conewood, Camden, N. J.
Radio Engrg. Laboratories, 100 Wilbur Ave., Long Island City, N. Y (Short Wave Kit.)
Radioloc Switch. See Cutler-Hammer Mfg. Co.
Radio Receptor Co., 106 7th Ave., New York.
Radiostat See Allen-Bradley Co.
Raola. See Modern Elec. Mfg. Co.
Recentrad. See Radio Recentor Co.
Resonator See F. & H. Radio Laboratories.
Remler See Gray & Danielson Co.
Resistaformer See Aerovox Wireless Corp.
Resistograd. See Pilot Radio & Tube Corp.
Rittenhouse Co., A. E., Honeoye Falls, N. Y. (Sole Selling Agent), Hatheway & Co., 16 Hudson, New York, N. Y.
Roberts Condenser. See Hammarlund Mfg. Co.

Roberston-Davis Co., 363 W. Superior, Chicago, Ill.
Royalty. See Electrad, Inc.
Samson Elec. Co., Canton, Mass.
Sangamo Electric Co., Springfield, Ill. (Transformers & Condensers.)
Scovill Mfg. Co., Waterbury, Conn.
Sensory. See Heinemann Electric Co.
Sevison Magneto Engr. Co., 379 Phillips Ave., Toledo, O.
Shallcross Mfg. Co., 700 Parker Ave., Collingdale, Pa.
Sickles Co., F. W., 130 Union, Springfield, Mass.
Signal Elec. Mfg. Co., Menominee, Mich.
Silver-Marshall, Inc., 6401 W. 65th St., Chicago. (Amplifier Kits.)
Silvertone. See Radio Receptor Co.
S. L. S. See Wireless Radio Corp.
S. L. T. See General Instrument Corp.
Splitmeter. See Premier Electric Co.
Sprague Specialties Co., North Adams, Mass.
Standard Transformer Co., Dana Ave., Warren, O.
Sta-Put. See Martin-Copeland Co.
Sterling Mfg. Co., 2831 Prospect Ave., Cleveland, O.
Stevens Mfg. Corp., 42 Spring, Newark, N. J.
Stromberg-Carlson Tel. Mfg. Co., Rochester, N. Y.
Super Multitormer. See Precise Mfg. Corp.
Super Tonatrol. See Electrad, Inc.
Supertran Transformer. See Ford Radio & Mica Co.
Symphony. See Modern Elec. Mfg. Co.
Syncrodenser. See Precise Mfg. Corp.
Telemonic Coil. See Condenser Corp. of America.
Telos Coil. See Condenser Corp. of America.
Thompson-Levering Co., 351 N. 37th, Philadelphia, Pa.
Thordarson Elec. Mfg. Co., 500 W. Huron, Chicago, Ill.
Tobe Deutschman Co., Canton, Mass.
Tone Control. See Sprague Specialties Co.
Transcript-Clapp Kit. See Samson Electric Co.
Truphonic Amplification. See Alden Mfg. Co.
Tunadarta. See Lynch, Arthur H.
Tung-Sol Condensers, Inc., 2317 Calumet Ave., Chicago, Ill. (Electrolytic Condensers.)
Twin-aud. See Peerless Radio Co.
Twin-Eight Transformers. See Bodine Electric Co.
Ultra Vario. See Bruno Radio Corp.
Univernier Condenser. See Auburn Button Works.
Universal Electro Chemical Corp., 50 W. 15th, New York
Universal Winding Co., Boston, Mass.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.
Variall Condenser. See Muter Co.
Volta. See Universal Electro Chemical Corp.
Volumgrad. See Pilot Radio & Tube Corp.
Ward Leonard Electric Co., 31 South, Mount Vernon, N. Y.
Wheeler Insulated Wire Co., Bridgeport, Conn.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn. N. Y.
Wireless Specialty Apparatus Co., 76 Atherton, Jamaica Plain, Boston, Mass.

RADIO HARDWARE. See Radio Mountings.

RADIO MOUNTINGS

Coil Mountings, Coil Sliders and Rods, Switches, Detectors, Detector and Grid Leak Mountings, Panel Brackets, Special Radio Hardware & Trimmings, Metal Dials, Metal Panels, etc.

Aerovox Wireless Corp., 80 Washington, Brooklyn, N. Y.
Alden Mfg. Co., Brockton, Mass.
American Emblem Co., Utica, N. Y. (Escutcheons.)
American Radio Hardware Co., 135 Grand, New York.
Bonza. See Haydon & Haydon.
Carborundum Co., Niagara Falls, N. Y. (Detector.)
De Jur-Amsco Corp., Broome and Lafayette Sts., New York, N. Y.
Chapman Machine Co., Terryville, Conn.
Durham & Co., 1936 Market, Philadelphia, Pa.
Electrad, Inc., 175 Varick, New York, N. Y.
Etched Products Corp., 90 Tenth, Long Island City, N. Y. (Metal Panels.)
Eureka. See Morse Co Frank W.
General Etching & Mfg. Co., 3072 West Grand Ave., Chicago, Ill. (Metal Panels & Escutcheons.)
Globe Technelian Corp., Reading, Mass.
Glodial. See Wireless Radio Corp.
Hart & Hegeman Mfg. Co., Hartford, Conn.
Haydon & Haydon, 167 Chambers, New York, N. Y.
Master Engineering Co., 771 Mather, Chicago, Ill.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Muter Co., Leslie F., 8440 S. Chicago Ave., Chicago
Na-Ald. See Alden Mfg. Co.
Union Insulating Co., 236 Broadway, New York, N. Y.
Waddell Mfg. Co., Grand Rapids, Mich.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn. Yaxley Mfg. Co., 1528 W. Adams, Chicago, Ill.

RADIO PANEL ENGRAVING. See Engraving, Radio Panel.

RADIO RECEIVER PARTS

Rheostats, Sockets, Plugs, Jacks.

Alden Mfg. Co., Brockton, Mass.
Acme Elec. & Mfg. Co., 1439 Hamilton Ave., Cleveland, O.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Amacostat. See American Apparatus Co.
American Apparatus Co., Richmond, Ind.
Automotive Equipment Co., 317 Halsey, Newark, N. J.
B. M. S. See Brooklyn Metal Stamping Corp.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. (Multiple Plugs.)
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Brach Mfg. Corp., L. S., 120 Sussex Ave., Newark, N. J.
Brooklyn Metal Stamping Corp., 718 Atlantic Ave., Brooklyn.
Cabelug. See Jones, Howard B.
Carter Radio Co., 407 S. Aberdeen, Chicago, Ill. (Also Socket Adapters.)
Cinch Mfg. Corp., 2335 W. Van Buren, Chicago, Ill.
Clarostat Mfg. Co., 285 N. Sixth, Brooklyn, N. Y.
Cle-Ra-Tone. See Benjamin Elec. Mfg. Co.
D. A. Radio Co., 30 Hollister, Buffalo, N. Y.
De Jur-Amsco Corp., Broome and Lafayette Sts., New York, N. Y.
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
Duostat. See De Jur-Amsco Corp.
Dynodilter Mfg. Co., 1022 E. 178th, New York, N. Y. (Interference Eliminator).
Eby Mfg. Co., H. H., 22nd & Lehigh Ave., Philadelphia.
Electrad, Inc., 175 Varick, New York, N. Y.
Electrical Insulation Corp., 308 W. Washington, Chicago.
Fantail Plug. See Brooklyn Metal Stamping Corp.
Frost, Herbert E., 1142 W. Beardsley, Elkhart, Ind.
Gem-Jac. See Frost, Herbert H.
General Instrument Corp., 225 Varick, New York, N. Y
General Radio Co., 30 State, Cambridge, Mass.
Gray & Danielson Mfg. Co., 2101 Bryant, San Francisco,
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Heinemann Elec. Co., Penn Ave. & Plum, Trenton, N. J.
Imp. See Carter Radio Co.
Jones, Howard B., 2300 Wabansia, Chicago. (Multiple Plug)
Martin-Copeland Co., 101 Sabin, Providence, R. I.
Microgrid. See Pilot Radio & Tube Corp.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Muter Co., Leslie F., 8440 S. Chicago Ave., Chicago.
Nutmeg. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.

Pacent Elec. Co., 91 Seventh Ave., New York, N. Y.
Pan-Tab Jack. See Frost, Herbert H.
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y.
Premier Elec. Co., 3800 Ravenswood Ave., Chicago, Ill.
Recto Mfg. Co., Appleton & B.&O. R.R., Cincinnati, O.
Robertson-Davis Co., 361 W. Superior, Chicago, Ill.
Royalty. See Electrad, Inc.
Samson Elec. Co., Canton, Mass.
Shallcross Mfg. Co., Collingdale, Pa.
Socostat. See D. A. Radio Co.
Tubestat. See Muter Co.
Wireless Radio Corp., Varick Ave. & Harrison Pl., Brooklyn
Workrite Radio Corp., 1838 E. 30th, Cleveland, O.
Yaxley Mfg. Co., 1528 W. Adams, Chicago, Ill.

RADIO RECTIFIER TUBES

Armstrong Electric Co., 187 Sylvan Ave., Newark, N. J.
Arcturus Radio Tube Co., 260 Sherman Ave., Newark, N. J
Audion. See De Forest Radio Co.
Cable Radio Tube Corp., 80 N. Ninth, Brooklyn, N. Y.
Ceco Mfg. Co., 1200 Eddy, Providence, R. I.
Robertson-Davis Co., 363 W. Superior, Chicago, Ill.
Cunningham, Inc., E. T., 370 Seventh Ave., New York, N. Y
Daven Co., 158 Summit, Newark, N. J.
DeForest Radio Co., Passaic, N. J.
Diamond Electric Co., Newark, N. J.
Diamond Vacuum Products Co., 4059 Diversey Ave., Chicago
Diatron. See Diamond Vacuum Products Co.
Eveready Raytheon. See National Carbon Co.
Gold Seal Electrical Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Hygrade Lamp Co., Salem, Mass.
Hytron Corp., Salem, Mass.
Jaeger Research Laboratories, 280 Park Ave., Weehawken, N. J.
Ken-Rad Tube & Lamp Corp., Owensboro, Ky.
National Carbon Co., Thompson Ave., Long Island City, N.Y.
National Union Radio Corp., 400 Madison Ave., New York.
Neptron. See Hygrade Lamp Co.
Paramount Mfg. Co., 79 Orange, Newark, N. J.
Pentode. See Ceco Mfg. Co.
Perryman Electric Co., 4901 Hudson Blvd., North Bergen, N. J.
Radio-Victor Corp. of America, 233 Broadway, New York.
Specialty Appliance Co., 6611 Euclid Ave., Cleveland, Ohio
Sylvania Products Co., Emporium, Pa.
United Radio & Elec. Corp., 500 Chancellor Ave., Irvington N. J.
Van Horne Tube Co., 250 Center, Franklin, Ohio.

RADIO TRANSFORMERS. See Radio Circuit Components

RADIO TUBE BASE BRANDERS. See Engraving Radio Panel.

RADIO TUBE BASES. See Radio Molded Parts.

RADIO TUBE BULBS (Unfinished). See Bulbs, Glass

RADIO TUBE PARTS

Filament Hooks, Mesh Plates, Special Bolts & Nuts, Stampings, etc.

Goat Radio Tube Parts, Inc., 33 35th, Brooklyn, N. Y. (Screens.)
Juno Fasteners, Inc., Hillside, N. J.
Newark Plate Laboratories, 228 Jelliff Ave., Newark, N. J. (Mesh Plates.)
Newark Wire Cloth Co., 351 Verona Ave., Newark, N. J. (Screens).

RADIUM POWDER AND PAINT

Radium Dial Co., 3552 Forbes, Pittsburgh, Pa.
Undark. See United States Radium Corp.
United States Radium Corp., 535 Pearl, New York, N. Y.

RANGE SWITCHES, Rotary Snap. See Switches, Snap Heavy Duty.

RAWHIDE GEARS. See Gears & Pinions, Rawhide.

READING LAMP BASES. See Bases, Reading Lamp.

REAMERS, Pipe. See Stocks, Dies and Reamers.

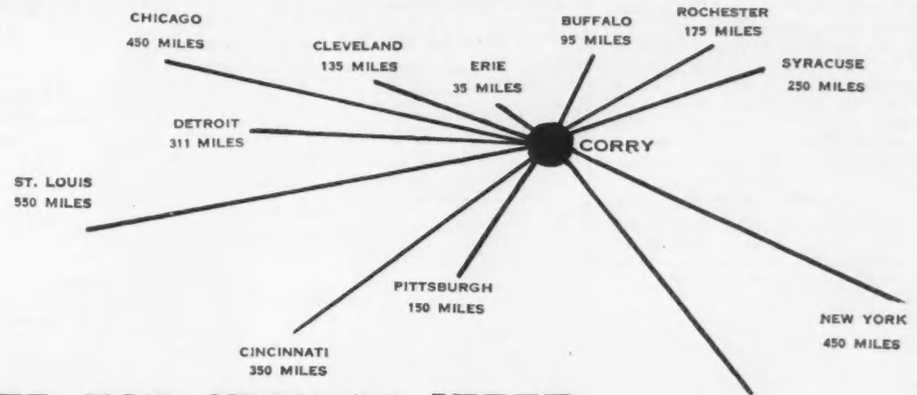
RECEPTACLES, Lamp. See Sockets and Receptacles.

RECEPTACLES, Plug, Heavy Duty

KEY

Battery Charging ..... See B
Floor Boxes ..... See F
Welding ..... See W
Machine Tool ..... See W
Watertight, Marine, Mine ..... See M
Car Trailer Connection ..... See C
Extension ..... See E

A. B. C. See Anderson Mfg. Co.
Adam Electric Co., Frank, St. Louis, Mo. F
Adapti Co., 2906 E. 72nd, Cleveland, O.. F
Anderson Mfg. Co., Albert & J. M., 289 A Boston, Mass. ..... B W M .. E
Appleton Elec. Co., 1703 Wellington Ave., Chicago, Ill. ..... M ....
Arktite. See Crouse-Hinds Co.
Arnessen Electric Co., 13 Water, New York ..... M ....
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.. F B W .. ....
Auth Electrical Specialty Co., 422 E. 53rd, New York, N. Y. ..... B
Benjamin Elec. Mfg. Co., Des Plaines, Ill. F .. W M .. ..
Bryant Elec. Co., 1421 State, Bridgeport, Conn. (Also Range Type.)..... W .. .. ..
Campbell. See Steel City Elec. Co.
Cannon Elec. Development Co., 420 West Ave., 33, Los Angeles, Cal..... F .. ..
C. E. M. Co. See Conn. Elec. Mfg. Co.
C. H. See Cutler-Hammer Mfg. Co.
Circle F Mfg. Co., Trenton, N. J..... M ....
Conduletto. See Crouse-Hinds Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn. ..... F .. ..
Cory & Son, Chas., 183 Varick, New York .. .. .. M ....
Crouse-Hinds Co., Syracuse, N. Y..... B W .. .. ..
Cutler-Hammer, Inc., 1238 St. Paul Ave., Milwaukee, Wis. ..... F .. ..
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa..... C ..
Fielding. See Stanley & Patterson.
Fountain's See Jenkins Mfg. Co.
Fullman Mfg. Co., Latrobe, Pa..... F .. .. M ....
Fullman. See Steel City Elec. Co.
General Elec. Co., Merchandise Dept., Bridgeport, Conn. ..... B .. ..
Gleason & Co., J. L., 241 Franklin, Boston, Mass. ..... B
Groundsafe. See Novelty Electric Co.
H. & H. See Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. .. B W .. .. ..
Hessel Co., W. F., 76 Greenwich, New York, N. Y. ..... W M .. B
Hubbell, Inc., Harvey, Bridgeport, Conn. (Also Range Type.)..... B W .. .. ..
Indestructible. See Kliegl Bros. Universal.
Jenkins Mfg. Co., Bloomfield, N. J.. .. .. B
Kliegl Bros. Universal Elec. Stage Light-



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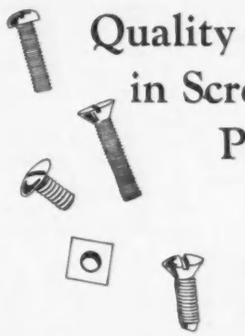

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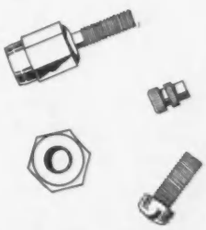

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ing Co., 321 W. 50th, New York, N. Y. F B W M . . .
Latrobe. See Fullman Mfg. Co.
Lexington Electric Products Co., 12 Chapel, Newark, N. J. . . . . C .
Leuffelholz & Co., Milwaukee, Wis. . . . . M . . .
Major Equipment Co., 4603 Fullerton ave., Chicago, Ill. . . . . F . . . . . .
Neco. See Novelty Elec. Co.
NePage McKenny Co., Seven Front, Seattle, Wash. . . . . C . .
Novelty Elec. Co., Tenth & Cherry Sts., Philadelphia, Pa. . . . . F . . . . . .
Ostrander Elect. Works, W. R., 911 Atlantic Ave., Brooklyn, N. Y.
Perkins. See Bryant Elec. Co.
Preset. See Walker Bros. Co.
Pyle National Co., 1334 N. Kostner Ave., Chicago, Ill. . . . . W M C B
Quadrangle Mfg. Co., 32 S. Peoria, Chicago, Ill. (Combination wall bracket and convenience outlet.) . . . . . F . . . . . .
Raco Mfg. Co., 123 N. Albany Ave., Chicago, Ill. . . . . F . . . . . .
Russell & Stoll Co., 53 Rose, New York F B W M . . . B
Square D Co., Detroit, Mich. . . . . W . . . . . .
Stanley & Patterson, 150 Varick, New York, N. Y. . . . . F . . . . . .
Steel City Elec. Co., 1207 Columbus Ave., Pittsburgh, Pa. . . . . F . . . . . E
Thomas & Betts Co., 15 Park Place, New York, N. Y. . . . . F . . . . . .
V. V. Fittings Co., 711 Cherry, Philadelphia, Pa. . . . . M . . . .
Walker Bros., 12 E. 41st St., New York, N. Y. . . . . F . . . . . E
Weldomatic. See Westinghouse Elec. & Mfg. Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa. . . . . F B W M . . . .
Yale. See Electric Products Co.
RECORDERS, Elapsed Time. See Indicators, Operation
REDUCERS. Socket. See Socket Reducers.
REFLECTOR LENSES. See Lenses.

REFLECTORS, Chromium Plated, Metal

Aga Auto Lamp Co., Amesbury, Mass.

REFLECTORS, Porcelain Enameled, Steel

ABolite Reflector Co., West Lafayette, Ohio.
Benjamin Elec. Mfg. Co., Des Plaines, Ill
Dunlap Co., John, Hammond & Gregg, Carnegie, Pa.
Duratach. See Wheeler Reflector Co.
Durex. See Wheeler Reflector Co.
Federal Electric Co., 8700 S. State, Chicago, Ill.
Goodlites. See Goodrich Elec. Co.
Goodrich Elec. Co., 2935 N. Oakley Ave., Chicago, Ill.
Isolux. See Wheeler Reflector Co
Jumbo. See Quadrangle Mfg. Co.
Marbellite Art Products Co., 1[illegible] N. Robey, Chicago, Ill.
Monk, H. E., 18 Warren, New York, N. Y.
Multi Elect. Mfg. Co., 210 N. Union Ave., Chicago, Ill.
Oamaco. See Overbaugh & Ayers.
Overbaugh & Ayers Mfg. Co., 411 S. Clinton, Chicago, Ill.
Para Steel. See Wheeler Reflector Co.
Perfection. See Tindall & White.
Quad. See Quadrangle Mfg. Co.
Quadrangle Mfg. Co., 32 S. Peoria, Chicago, Ill.
Reliability. See ABolite Reflectors Co.
Richardson Reflector Co., 16 Hudson, New York, N. Y
Sturdon. See Benjamin Elec. Mfg. Co.
Tindall & White, 33 W. 60th, New York, N. Y.
Vaporlux. See Wheeler Reflector Co.
Westinghouse Elec. & Mfg. Co., South Bend, Ind.
Wheeler Reflector Co., 275 Congress, Boston, Mass
REFRACTORIES, Porcelain. See Cores Resistance Coil.
REFRIGERANTS. See Chemicals, Refrigeration.
REFRIGERATION CHEMICALS. See Chemicals, Refrigeration.

REFRIGERATOR CABINETS

Alaska Refrigerator Co., Muskegon, Mich.
Arlington Refrigerator Co., Arlington, Vt.
Baldwin Refrigerator Co., Burlington, Vt.
Banta Refrigerator Co., Clearfield, Pa.
Belding-Hall ElectrICE Corp., Belding, Mich.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bohn Refrigerator Co., St. Paul, Minn.
Cavalier. See Tennessee Furniture Co.
Champion Refrigerator Co., 206 Lexington Ave., New York.
Crystal Refrigerator Co., Fremont, Neb.
Crysteel. See Benjamin Elec. Mfg. Co.
Dry-Air. See Baldwin Refrigerator Co.
Eddy & Sons Co., D., 836 Adams, Boston, Mass.
Erie Art Metal Co. & Erie Metal Furniture Co., Erie, Pa.
General Necessities Corp., General Necessities Bldg., Detroit, Mich.
Gibson Refrigerator Co., Greenville, Mich.
Gloekler Co., Bernard, 1627 Penn Ave., Pittsburgh, Pa.
Harder Refrigerator Corp., Cobleskill, N. Y.
Heintz Mfg. Co., Front & Olney Aves., Philadelphia, Pa.
Heinz & Munschauer, Superior and Randall, Buffalo, N. Y.
Herrick Refrigerator Co., 1803 River, Waterloo, Iowa.
Hibbard Cabinets, Inc., 6504 Euclid Ave., Cleveland, O.
Holderle Bros., Inc., 339 Exchange, Rochester, N. Y.
Howe Seals Co., Rutland, Vt.
Jewett Refrigerator Co., Buffalo, N. Y.
Kingston. See Lorillard Refrigerator Co.
Kleen Kold. See Harder Refrigerator Corp.
Knox. See Erie Art Metal Co.
Leonard Refrigerator Co., Div. of Kelvinator Corp., Grand Rapids, Mich.
Liver & Co., C. B., Omaha, Neb.
Loeber Co., Henry G., 151 E. 126th, New York, N. Y. (Ice Cream Cabinet.)

Lorillard Refrigerator Co., 40 Cooper Square, New York.
Louisville Refrigerator Corp., 4460 Louisville Ave., Louisville, Ky.
Louisville Tin & Stove Co., Louisville, Ky.
Mars & Co., L. H., 55 E. 150th, New York, N. Y.
Maine Mfg. Co., Nashua, N. H.
McCray Refrigerator Sales Corp., 2664 Lake St., Kendallville, Ind.
Mowatt Refrigerator Co., 25 Oak Grove, San Francisco, Cal.
Omaha Fixture & Supply Co., 11th and Douglas, Omaha
Oreole. See Ottenheimer Bros.
Ottenheimer Bros., Baltimore, Md.
Reol. See Ottenheimer Bros.
Reolite. See Ottenheimer Bros.
Schmidt Co., C., John and Livingston, Cincinnati, O.
Seeger Refrigerator Co., St. Paul, Minn.
Steeprest. See Heintz Mfg. Co.
Success Mfg. Co., Gloucester, Mass.
Tennessee Furniture Co., Chattanooga, Tenn.
Vogt. See General Necessities Corp.
Ward Refrigerator Co., 6061 S. Alameda, Los Angeles, Cal
White Mountain. See Maine Mfg. Co.
White Seal. See Louisville Refrigerator Co.
REFRIGERATOR CONDENSER UNITS. See Condenser Units, Refrigerator.

REFRIGERATOR FITTINGS

Commonwealth Brass Corp., Commonwealth Ave. & G. T. R. R., Detroit, Mich.

REGULATORS, Temperature

American Radiator Co., 1807 Elmwood Ave., Buffalo, N. Y. (Mercury Switch Type.)
American Teletherm Co., 1017 Summit, Toledo, O.
American Thermostat Co., 226 Jelliff Ave., Newark, N. J.
Automatic Electric Heater Co., 1524 Race, Philadelphia, Pa. (Furnace.)
Automatic Reclosing Circuit Breaker Co., Columbus, O.
Boston Machine Wks. Co., 7 Willow, Lynn, Mass.
Bristol Co., Platies Bridge & Naugatuck Rd., Waterbury, Conn.
Brown. See Electric Automatic Appliance Co.
Brown Instrument Co., Wayne & Windrim, Philadelphia.
Casco. See Cobb Electric Appliance Co.
Cobb Electric Appliance Co., 100 Massachusetts Ave., Boston.
Davis & Daggett Co., 238 Dwight, Springfield, Mass.
Duo-Stat. See Raymond Co.
D. & T. Manufacturing Co., 3001 La Salle, St. Louis, Mo.
Dunco. See Struthers Dunn, Inc.
Electric Automatic Appliance Co., 1748 Arapahoe, Denver, Colo.
Engelhart, Chas., 90 Chestnut, Newark, N. J.
Gifford Heat Control Systems, 1 Broadway, New York.
Gold Car Htg. & Ltg. Co., 220 36th, Brooklyn, N. Y.
Hart Mfg. Co., Hartford, Conn.
Hermansen Elect. Co., 505 W. 41st, New York, N. Y.
Hynes & Cox Elec. Corp., 444 N. Pearl, Albany, N. Y.
Jewell Mfg. Co., Auburn, N. Y.
Johnson Service Co., 149 Michigan, Milwaukee, Wis.
Lockswitch. See Time-O-Stat Controls Co.
Majestic Electric Appliance Co., San Francisco, Cal.
Marvel. See American Thermostat Co.
Mercoid Corp., 4201 Belmont Ave., Chicago, Ill. (Mercury Switch.)
Minneapolis-Honeywell Regulator Co., 2753 Fourth Ave., Minneapolis, Minn.
Penn Electric Switch Co., E. 20th & Walnut Sts., Des Moines, Iowa.
Protectostat. See Minneapolis-Honeywell.
Quick Freeze. See Penn Electric Switch Co.
Ranco. See Automatic Reclosing Circuit Breaker Co.
Raymond Co., F. L., 228 N. La Salle, Chicago, Ill.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
Simplex Heat Regulator, 2938 Pillsbury Ave., Minneapolis
Snapon. See Tagliabue Mfg. Co.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Sure Fire. See Boston Machine Wks.
Tagliabue Mfg. Co., C. J., 18 33rd, Brooklyn, N. Y.
Time-O-Stat Controls Co., Elkhart, Ind.
Trent Co., Harold E., 439 N. 12th, Philadelphia, Pa.
Webster Elec. Co., Racine, Wis.
White Mfg. Co., 2362 University Ave., St. Paul, Minn.
Wilcolator Co., 17 Nevada, Newark, N. J.
Wilson-Maulin Co., 383 Concord Ave., New York, N. Y

REGULATORS, Voltage

American Instrument Co., 774 Girard, N. W., Washington, D. C.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Marshall Electric Co., Elkhart, Ind.
Rotor. See Ward-Leonard Electric Co.
States Co., 19 New Park Ave., Hartford, Conn.
Ward-Leonard Electric Co., 31 South, Mount Vernon, N. Y. (See also Circuit Breakers and Thermostats.)

RELAYS

American Brown Boveri Elec. Corp., Camden, N. J.
Automatic Switch Co., 154 Grand, New York, N. Y.
Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Burkaw, Inc., 30 Court, Newark, N. J.
Burke Controller Co., 369 Lexington Ave., New York, N. Y
Electric B-G Products Co., Ithaca, Mich.
Dunco. See Struthers Dunn, Inc.
General Electric Co., Schenectady, N. Y
G-M Laboratories, Inc., Grace & Ravenswood Ave., Chicago.
Grid Glow. See Westinghouse Elec. & Mfg. Co.
Leach Relay Co., 860 S. Los Angeles, Los Angeles, Cal.
McWilliams. See Electric B-G Products Co.
Roller-Smith Co., 239 Broadway, New York, N. Y.
Signal Engineering & Mfg. Co., 146 W. 14th, New York
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Wilcolator Co., 17 Nevada, Newark, N. J.
REMOTE CONTROL SWITCHES. See Switches, Remote Control.

REMOVERS, Coil

Ewing Mfg. Company, Middleport, Ohio
RESINOID PLASTICS. See Molded Insulation.

RESISTANCE

Boxes. See Instruments, Laboratory Standard
Coil Cores. See Cores, Resistance.
Test Sets. See Instruments
Units, Radio. See Radio Circuit Components
Units. See Units, Rods & Grids.
Wire. See Wire Bare.

RESISTORS

Hardwick, Hindle, Inc., 216 Emmett, Newark, N. J.
Ohmite Mfg. Co., 633 N. Albany Ave., Chicago, Ill.
Ward Leonard Electric Co., 31 South, Mount Vernon, N. Y.
RESISTORS. See Units, Rods & Grids.
RESURFACERS, Commutator. See Stones, Commutator, also Tools, Commutator Truing.
REVOLUTION COUNTERS. See Tachometers.

RHEOSTATS.

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Radio. See Radio Receiver Parts.
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Plating Tank	See P
Motion Pictures (Projector Lamp)	See M
Motor Starting, Field and Speed Regulating	See F

F B D P M

Allen-Bradley Co., 493 Clinton, Milwaukee L
Beck Bros., 421 Sedgley Ave., Philadelphia, Pa. L
Biddle, James G., 1209 Arch, Philadelphia L
Brach Mfg. Corp., L. S., Newark, N. J. (Radio Battery Control.) . . . . . B . . . . . .
Bradleystat. See Allen-Bradley Co.
Columbia Electric Mfg. Co., 1293 E. 53rd, Cleveland, O. . . . . P . . .
Controlite. See Ward Leonard Elec. Co.
Cutler-Hammer, Inc., 1388 St. Paul Ave., Milwaukee, Wis. . . . . F B D . . . L
Economic Rheostat Switch Co., 3551 N. 5th, Philadelphia, Pa. . . . . F . . . . . .
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland, O. . . . . F . . . . . .
Electric Products Co., 1725 Clarkstone Rd., Cleveland, O. . . . . B . . . . . .
General Electric Co., Schenectady, N. Y. F L
Hanson-Van Winkle-Munning Co., Matawan, N. J. . . . . P . . .
Holzmuller, C. J., 1108 Howard, San Francisco, Cal. . . . . D . . . . .
Eliegl Bros. Universal Elec. Stage Lighting Co., 321 W. 50th, New York, N. Y. . . . D . . M . .
Knoeller Elec. Co., De Pere, Wis. . . . . F . . . . . .
National Elec. Controller Co., 5315 Ravenswood Ave., Chicago. . . . . F B D . . M L
Optimus. See Hanson-Van Winkle-Munning Co.
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Schaefer Bros. Co., 1059 W. 11th, Chicago . . B . . . . . .
Simplicity. See Cutler-Hammer Mfg. Co.
Robertson, Leo F., Inc., 533 W. 22nd, Rubicon Co., 29 N. Sixth, Philadelphia. L
Universal. See Ward Leonard Elec. Co.
Vitrohm. See Ward Leonard Elec. Co.
Ward Leonard Elec. Co., 31 South, Mt. Vernon, N. Y. . . . . F . . D . . M . .
Manufacturers Belt Hook Co., 1315 W. Congress, Chicago, Ill.
Nelson Rivet Co., Taunton, Mass.
Stimpson Co., Edwin B., 70 Franklin Ave., Brooklyn, N. Y.
Thomson Mfg. Co., Judson L., Waltham, Mass.
Tubular Rivet & Stud Co., 97 Lincoln, Boston, Mass.
Waterbury Brass Goods Co., Waterbury, Conn.
Wright & Corson Mfg. Co., Bridgeport, Conn.
RODS, Resistance. See Units, Rods and Grids.
ROLLER BEARINGS. See Bearings, Ball and Roller.

ROLLS, Coil Flattening

Columbia Machine Tool Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
RUBBER BELTS. See Belts, Rubber.

RUBBER, Hard

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American Hard Rubber Co., 11 Mercer, New York, N. Y.
Connecticut Hard Rubber Co., West Haven, Conn.
Goodrich Rubber Co., B. F., Akron, O.
Insuline Corp. of America, 78 Cortlandt, New York, N. Y
Luzerne Rubber Co., Muirhead, near Dewey, Trenton, N. J
Mahoganite. See American Hard Rubber Co.
New York Hard Rubber Turning Co., 212 Centre, New York
Panelyte Corp., Lincoln Bldg., New York, N. Y.
Radiolite. See Superior Hard Rubber Co.
Stokes Rubber Co., Jos., Trenton, N. J.
Superior Hard Rubber Co., Butler, N. J.
United States Rubber Co., 1790 Broadway, New York, N. Y
Vulcanized Rubber Co., 251 4th Ave., New York, N. Y.
Vulco Panels. See Vulcanized Rubber Co.

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Manhattan Rubber Mfg. Co., Willet, Passaic, N. J
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Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sun Rubber Co., Barberton, O.
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RUBBER, SEMI-HARD. See Rubber Mechanical Goods

RUBBER, Sponge

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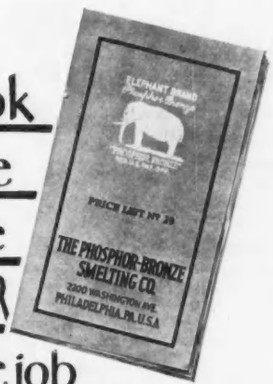

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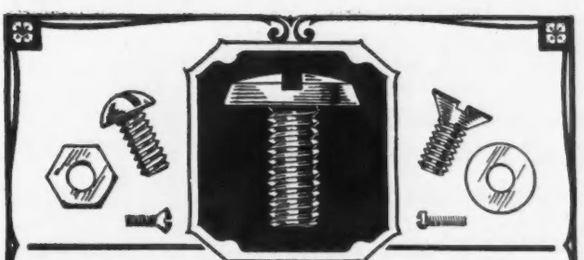

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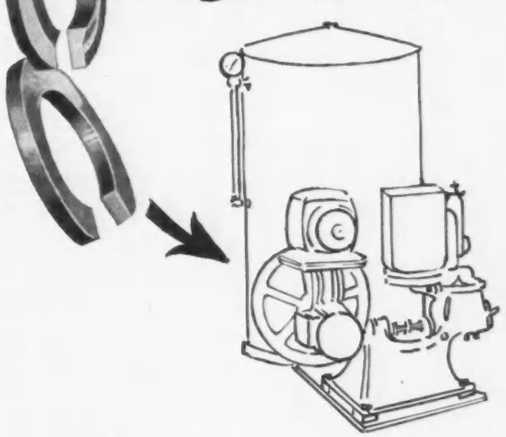

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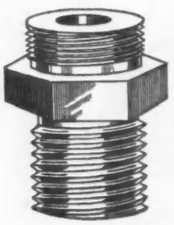

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Chapman Machine Co., Terryville, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
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Hanson, Einar R., 17 Hermon, Worcester, Mass.
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Shimer & Sons, Samuel J., Milton, Pa.
Steiner & Co., 297 Washington, Newark, N. J.
Thomaston Mfg. Corp., Thomaston, Conn.
Watkins Co., D. M., 270 Pine, Providence, R. I.
Waterbury Brass Goods Corp., Waterbury, Conn.
Wilmington Fibre Specialty Co., Wilmington, Del.
Wright Machine Co., 79 Armory, Worcester, Mass.

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Hartford Machine Screw Co., Hartford, Conn.

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Clark Metal Products, Inc., 400 Hancock Ave., Bridgeport, Conn.
Elco Tool & Screw Corp., 1818 Broadway, Rockford, Ill.
Hassall, Inc., John, 402 Oakland, Brooklyn, N. Y.
Hubbell, Inc., Harvey, Bridgeport, Conn.
New England Screw Co., Dept. A, 44 Farnsworth, Boston.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Progressive Mfg. Co., Torrington, Conn.
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Strong Carlisle & Hammond, 1392 W. Third, Cleveland, O.
United Screw & Bolt Corp., 2713 Cullerton, Chicago, Ill.

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SEGMENTS. See Discs, Armature.

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Carlile & Doughty, 2530 N. Broad, Philadelphia, Pa.
Chattanooga Battery Box Co., Chattanooga, Tenn.
Certified. See Ermet Products Co.
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Estes & Sons, E. B., 25 Vanderbilt Ave., New York. (Wood.)
Indianapolis Box & Separator Co., 2101 Yandes, Indianapolis, Ind. (Wood.)
Indianapolis Mfg. Co., Indianapolis, Ind.
Inseco. See Indianapolis Box & Separator Co.
Link & Hemrick, Inc., 555 W. 52nd, New York, N. Y.
Red Band. See Indianapolis Mfg. Co.
Stewart Mfg. Co., Wm. E., 14th & Elm, Flint, Mich. (Wood.)
Wick Lumber Co., R., 539 W. 52nd, New York. (Wood.)

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Asbestos. See Shades, Fabric.
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Cretonne. See Shades, Fabric.
Leaded. See Shades and Domes.
Leather. See Shades, Fabric.
Linen. See Shades, Fabric.
Mica. See Shades, Mica.
Molded. See Molded Insulation.
Mosaic. See Shades and Domes.
Parchment. See Shades, Fabric.
Paper. See Shades, Fabric.
Silk. See Shades, Fabric.
Stamped Metal. See Shades, Metallic; also Shades and Domes.
Steel. See Shades, Metallic.
Tin. See Shades, Metallic.
Zinc. See Shades, Metallic.

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Andrews Co., C. M., 32 E. 30th, New York, N. Y. (Silk.)
Art Lamp Shade Studios, 216 Fifth Ave., New York, N. Y.
Audrey Art Shade Studios, 105 Thatford Ave., Brooklyn.
Bloch & Co., L. D., 37 E. 18th, Newark, N. Y.
Borghese. See Hall, Chas.
Clark, H. W., 813 Fourth Ave. N., Troy, N. Y. (Parchment.)
Daiger Co., Charles V., 76 Essex, Boston, Mass. (Silk.)
Eastern Art Shop, 14 W. 19th, New York. (Parchment.)
Foss, Leonard R., 1338 E. 12th, Oakland, Cal. (Parchment.)
Foslite. See Foss, Leonard R.
Frostelene. See Art Lamp Shade Studios.
Gibson Art Co., 223 W. Fourth, Cincinnati, Ohio. (Paper.)
Hall, Chas., 3 E. 40th, New York, N. Y. (Paper Parchment.)
Hanson Co., Paul, 15 E. 26th, New York, N. Y. (Chintz.)
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Herco Art Mfg. Co., Meriden, Conn.
Idealite Lamp Shade Mfg. Co., 4955 Fremont, Jersey City, N. J. (Parchment.)
Kaps Shell. See Wardwell, E. H.
Kerwin. See Hall, Chas.
Kno-Glair. See Hamilton, M. E.
Lamb Bros. & Greene Corp., Napannee, Ind. (Silk.)
Luxrite. See John H. St. John.
Monarch Lamp & Shade Co., 210 N. Second, Philadelphia, Pa. (Silk.)
Merimura Bros., 58 W. 23rd, New York. (Bamboo, Silk, Cretonne.)
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Peerless Lamp Shade Mfg. Co., 114 E. 25th, N. Y. (Silk.)
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Rosita Studio, 10 W. 28th, New York, N. Y. (Parchment and Leatherette.)
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Springel & Son, A., 26 S. 3rd, Philadelphia, Pa.
St. John, John H., 1298 Atlantic Ave., Brooklyn, N. Y. (Silk.)
Superior Lamp Shade Manufacturers, 72 Madison Ave., New York, N. Y. (Silk.)
Tombs Studios, Wm. H., 172 Pennsylvania Ave., Newark, N. J. (Parchment Paper.)
Trio Mfg. Co., 610 N. American, Philadelphia, Pa. (Silk.)
Utility Shade Co., Tenafly, N. J.
Vogue Lamp & Shade Co., 130 W. 17th, New York, N. Y. (Parchment.)
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Tar Heel Mica Co., Plumtree, N. C.
Tarmilite. See Tar Heel Mica Co.

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SHEARS, Insulation

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SHEARS, Power

Niagara Machine & Tool Wks., 637 Northland, Buffalo, N. Y.

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SIGN LETTER LENSES. See Lenses.

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Wilco. See Wilson Co., H. A.
Wilson Co., H. A., Newark, N. J.

SILVER SOLDER. See Solder, Silver.
SINE WAVE OSCILLATORS. See Instruments, Laboratory Standard.
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SLEEVE-BEARINGS. See Bearings and Bushings.
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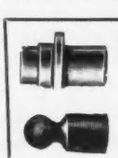
South Bend Lathe Works, 425 E. Madison, South Bend, Ind.
Weidenhoff, Joseph, 4852 Roosevelt Rd., Chicago, Ill.



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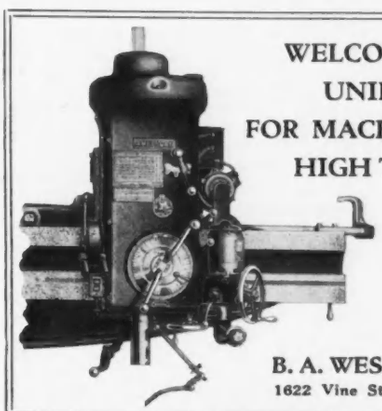

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Lin-Stun. See Westinghouse.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
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SOCKET SHELLS. See Shells, Screw Socket.
SOCKETS, Flashing. See Flashers, Sign.

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Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Bryant Electric Co., Bridgeport, Conn.
Duplex. See Warner Bros. Co.
Eade, John E., 104 Point, Providence, R. I. Links, Insulators
Easylite. See Rittenhouse Co., A. E.
Economy. See Harvey Hubbell, Inc.
Flory, Wm. E., 38 W. 32nd, New York, N. Y. (Decorative Pull Chains.)
Gripper. See Wittenberg Bros.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. (Metal Pull Tassel.)
Hubbell, Inc., Harvey, Bridgeport, Conn. (Links and Acorns. Metal Pull Tassels.)
Paiste. See Hart & Hegeman Mfg. Co.
Pass & Seymour, Inc., Solvay Sta., Syracuse, N. Y. (Pull Chain Tassel.)
P. & S. See Pass & Seymour, Inc.
Rittenhouse Co., A. E., Honeoye Falls, N. Y. (Sole Selling Agent, Hatheway & Co., 16 Hudson, New York, N. Y.)
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Royal. See Sears, Henry D.
Scovil Mfg. Co., Waterbury, Conn. (Acorn.)
Sears, Henry D., 50 Boylston, Boston, Mass.
Waterbury Brass Goods Co., Waterbury, Conn. (Acorns.)
Weber. See Sears, Henry D.
Wittenberg Bros., 60 Shipman, Newark, N. J. Links, Insu-

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Benjamin Elec. Mfg. Co., Des Plaines, Ill.
Cea-del-lite. See Sears, Henry D.
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Electric Co., 94 Allyn, Hartford, Conn.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hart & Hegaman Div. of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn.
Morse Co., Frank W., 291 Congress, Boston, Mass.
Pass & Seymour, Solvay Sta., Syracuse, N. Y.
Propp Co. M., 524 Broadway, New York, N. Y.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Sears, Henry D., 50 Boylston, Boston, Mass.
SOCKETS, Radio. See Radio Receiver Parts.

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Bases other than Standard (or Medium) are indicated as follows: Mogul, M; Candelabra (or Miniature), C.

Key	See K
Composition	See W
Metal Shell	See B
Porcelain	See A
Pull Chain	See P
Push Through	See T
Sign Receptacles	See A

A. B. C. See Leviton Mfg. Co.
Acme Elec. & Mfg. Co., Canal & Hamilton Ave., Trenton, N. J. ..... A
Ajax Elec. Specialty Co., 1928 Chestnut, St. Louis, Mo. ..... W
Alabax. See Arrow Elec. Co.
Alcor Mfg. Co., 4605 W. Madison, Chicago, Ill. C
Appleton Electric Co., 1703 Wellington
Appleton Electric Co., 1730 Wellington Ave., Chicago, Ill. ..... A
Armstrong & White, 9th and Liberty Ave., Pittsburgh, Pa. ..... A
Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. M C K T P B A
Arrogrip. See Arrow Elec. Co.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. ..... C . . . . P B .
Best. See United States Elec. Mfg. Corp.
Bryant Elec. Co., Bridgeport. . . . M C K T P B A
C-H. See Cutler-Hammer Mfg. Co.
Circle F Mfg. Co., Trenton, N. J. C. . M . . K T P B A
Circle T. See Trumbull Elec. Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn. .....
Connecticut Elec. Mfg. Co., Bridgeport, Conn. ..... M . . K T . . B A
Crouse-Hinds Co., Syracuse, N. Y. . . A W . . . . . .
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. ..... K T . . B A
Durex. See Wheeler Reflector Co.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Far-Go Elec. Mfg. Co., 368 Broome, New York, N. Y. C
Federal Electric Co., 3700 S. State, Chicago, Ill. ..... A
Flute. See Pass & Seymour.
Fluteller. See Pass & Seymour.
Frink Co., Inc., 369 Lexington Ave., New York, N. Y. ..... M C . . . . . B .
Gaynor Elec. Co., Stratford, Conn. .....
General Elec. Co., Merchandise Dept., Bridgeport, Conn. ..... M C K T P B A
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. ..... M C K T P B A
Harter. See Multi Elec'l. Mfg. Co.
Hoosick Falls Radio & Elec'l. Parts Mfg. Co., Hoosick Falls, N. Y. . . . . W . . . . . .
Horan Co., E. S., 550 Monroe, Carlstadt, N. J. .....
Hubbell, Inc., Harvey, Bridgeport, Conn. M C K T P B A
H. & H. See Hart & Hegeman.
J-D-A. See Watson Mfg. Co., J. E.
K-E Cleat Receptacle. See Kirkman.
Leader. See Leviton Mfg. Co.
Leiser & Co., W. A., 1607 Sansom, Philadelphia, Pa. ..... A
Leviton Mfg. Co., 236 Newell, Brooklyn, N. Y. ..... M C K . . P B A
Levolier. See McGill Mfg. Co.
Liberty Bell. See Hart & Hegeman.
Locat-A-Catch. See Connecticut
McGill Mfg. Co., Valparaiso, Ind. ..... P B A
Molded Socket Corp., Railroad, Pa. ..... K .....
Multi Elec'l Mfg. Co., 1840 W. 14th, Chicago, Ill. ..... A
Multilok. See Circle F Mfg. Co.

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Newgard. See Multi Elec'l Mfg. Co.
New Wrinkle. See Bryant Elec.
Noark. See Colt's Patent Fire Arms.
P. & S. See Pass & Seymour.
Pass & Seymour, Solvay Station, Syracuse, N. Y. ..... M C K T P B A
Paulding, John I., New Bedford, Mass. ..... B A
Perkins. See Bryant Elec. Co.
Porcelain Products, Inc., Findlay, O. ..... A
Quick Catch. See Hubbell, Inc.
Royal. See Sears, Henry D.
Ryan Appliance Co., 117 Mulberry, Trenton, N. J. ..... W . . . . . A
Safti Soc. See Molded Socket Corp.
Sears, Henry D., 80 Boylston, Boston ..... M C K T P B A
Security. See Circle F Mfg. Co.
Shurlock. See Pass & Seymour.
Siemen Co., Bridgeport, Conn. .....
Taplet Mfg. Co., 3709 Powelton Ave., Philadelphia, Pa. ..... A
Titan. See Bryant Elec. Co.
Trumbull Elec. Mfg. Co., Plainville, Conn. ..... A
Union Insul. Co., Parkersburg, W. Va. .....
United States Elec. Mfg. Corp., 222 W. 14th, New York, N. Y. ..... P . . B . . W
U. S. Electric Co., 18 Chambers, Trenton, N. J. ..... A
Walco. See Leiser & Co., W. A.
Weber. See Sears, Henry D.
Wheeler Reflector Co., 275 Congress St., Boston, Mass. ..... P . . . .
Wood Electric Co., C. D., 565 Broadway, New York. (Sign Receptacles.) ..... A
Woodwin. See Wood Elec. Co.
Wrinklet. See Bryant Elec. Co.

SOLDER, Aluminum
Aluminum Solder Corp. of America, 730 Fifth Ave., New York, N. Y.
Federated Metals Co., 233 Broadway, New York, N. Y.
Lasher-Weeber Co., 261 Franklin, Boston, Mass.
Lenk Mfg. Co., 30 Merrimac, Boston, Mass.
Solderlume. See Aluminum Solder Corp. of America
Supreme. See Lasher-Weeber Co
Usarco. See Federated Metals Co.

SOLDER, Bar and Wire
Eagle. See Hoyt Metal Co.
Genuine A. See Hoyt Metal Co.
Hoyt Metal Co., St. Louis, Mo.

SOLDER, Self-Fluxing
Dutch-Boy. See National Lead Co.
Gardiner Metal Co., 1365 W. Lake, Chicago, Ill.
Kester Solder Co., 4210 Wrightwood Ave., Chicago, Ill.
Lenk Mfg. Co., 32 Merrimac, Boston, Mass.
National Lead Co., 111 Broadway, New York, N. Y.
Philadelphia Solder Co., 16th & Indiana Ave., Philadelphia, Pa.
Silva-Wares, Inc., 134 W. 26th St., New York, N. Y.
Solderall Co., 129 Sussex Ave., Newark, N. J.

SOLDER, Silver
Handy & Harman, 57 William, New York, N. Y.
Wilson Co., H. A., Newark, N. J.

SOLDERING
Compounds. See Soldering Compounds.
Irons. See Soldering Irons.
Machines. See Soldering Machines, Commutator
Pots. See Melting Pots & Ladles.
Tools. See Torches and Furnaces.

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Amco. See American Solder & Flux Co.
American Solder & Flux Co., 2910 N. 16th, Philadelphia, Pa.
Armstrong Ke-Ti Products Co., 491 N. Front, Columbus, O.
Benson Co., Alex R., Hudson, N. Y. (Salts and Paste.)
Burnley Battery & Mfg. Co., North East, Pa. (Paste and Stick.)
Brunner Chemical Wks., 217 E. 3rd, Cincinnati, O.
Callahan & Co., Geo., 218 Front, New York. (Fluid.)
Central Stamping Co., 206 Broadway, New York, N. Y. Paste and Salts.
Challenge. See Highland Electro Chemical Co.
Chase Brass & Copper Co., 236 Grand, Waterbury, Conn.
Conductalute. See Technical Products Co.
Crescent. See McGill Mfg. Co.
Dielectric Mfg. Co., St. Louis, Mo.
Dunton Co., M. W., Providence, R. I.
Dutch-Brand. See Van Cleef Bros.
Eureka. See Grasselli Chemical Co.
Firth Radio Corp., 25 Beaver, New York, N. Y.
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Leveridge, Inc., Chas. W., 246 Fulton, New York, N. Y.
Lotan Research Corp., 6545 Euclid Ave., Cleveland, O.
Luco. See Lukens Metal Co.
Lukens Metal Co., T. F., 1105 Fairmount Ave., Philadelphia, Pa.
McGill Mfg. Co., Valparaiso, Ind. Fluid.
Mitchell-Rand Mfg. Co., 19 Vesey, New York. (Paste.)
Neutral. See Dielectric Mfg. Co.
New-Idea. See Hartwig Co., Wm. J.
Nokorode. See Dunton Co., M. W.
Oakwood. See Weaver Specialty Co.
Paragon Insulating Co., 5716 Euclid Ave., Cleveland, O.
Perfecto. See Firth Radio Corp.
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Queens. See Brunner Chemical Works.
Reade Mfg. Co., 133 Hoboken Ave., Jersey City, N. J. (Fluids, Salts, Paste).
Redina. See Reade Mfg. Co.
Red-Letter. See Ruby Chemical Co.
Rodale Mfg. Co., 200 Hudson, New York, N. Y. (Paste.)
Rotax Mfg. Co., Bathgate Place, Newark, N. J.
Ruby Chemical Co., Columbus, O.
Ruby Fluid. See Ruby Chemical Co.
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Snarr & Co., Geo. W., 110 S. Ninth, St. Louis, Mo. (Paste.)
Snowflake. See Grasselli Chemical Co.
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Solderine. See Central Stamping Co.
Solderite, Inc., 22 Green, Newark, N. J.
Speco. See Pfanstiehl Chemical Co.
Standard. See Grasselli Chemical Co.
Star. See McGill Mfg. Co.
Superior. See Highland Electro Chemical Co.
Technical Products Co., 2308 Main, Pittsburgh, Pa. (Paste.)
Tinol. See American Solder & Flux Co.
Van Cleef Bros., 7722 Woodlawn Ave., Chicago, Ill.
Weaver Specialty Co., 6344 Aurelia, Pittsburgh, Pa.
Yager's. See Benson Co., Alex. R.
Yankee. See Leveridge, Inc., Chas. W.

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Adroit. See Adrola Corp.
Adrola Corp., Port Jefferson, N. Y.
American Beauty. See American Elec'l. Heater Co.
American Elec'l. Heater Co., Woodward & Burroughs Ave., Detroit, Mich.
Beardsley & Wolcott Mfg. Co., Waterbury, Conn.
Beckwith Machine Co., 402 Chestnut, Ravenna, Ohio.
Betsy Ross. See Central Flatiron Mfg. Co.
Brach Mfg. Corp., L. S., Newark, N. J.
Burnley Battery & Mfg. Co., North East, Pa.
Central Flatiron Mfg. Co., Johnson City, N. Y.
Chapman Machine Co., Terryville, Conn.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Davis Specialty Works, East Gary, Ind.
Dominion Elec'l Mfg. Co., 712 Ontario Ave., N., Minneapolis.
Dover Mfg. Co., Dover, O.
Drake Elec. Wks., 3943 Lincoln Ave., Chicago, Ill.
Electrahot Mfg. Co., 525 S. 4th, Minneapolis, Minn.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland. (Transformer Soldering Outfit.)
Electric Soldering Iron Co., Inc., 135 W. 17th, New York
Enco. See Electrical Necessities Corp.
Esico. See Electric Soldering Iron Co.
Everhot. See Swartzbaugh Mfg. Co.
Ever-Ready. See Gold Seal Elec. Co.
General Electric Co., Schenectady, N. Y.
Gold Seal Elec'l. Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Industrial. See Permway Mfg. Co.
Jiffy. See Koch & Co., Paul W.
King. See Electric Heat Control Co.
Koch Co., Paul W., 19 S. Wells, Chicago. (Solder Dipper.)
Landers, Frary & Clark, New Britain, Conn.
Lenk Mfg. Co., 30 Merrimac, Boston, Mass.
Lotan. See Simplex Flux & Solder Co. of America.
Lucifer. See Jones Point Tool & Elec. Co.
Majestic Electric Appliance Co., San Francisco, Cal.
Manning-Bowman & Co., Meriden, Conn.
Moto-Ray Mfg. Co., 169 Massachusetts Ave., Boston, Mass.
National Specialties Co., Howell & Tyler Sts., Fort Wayne, Ind.
Northern Elec. Co., 2833 N. Western Ave., Chicago, Ill.
Queen Quality. See Watlow Elec. Mfg. Co.
Quick-Hot. See Moto-Ray Mfg. Co.
Reliance. See Landers, Frary & Clark.
Samson-United Corp., Probert, Rochester, N. Y.
Simplex Div. of Edison General Elec. Appliance Co., Inc., 5600 W. Taylor, Chicago, Ill.
Simplex Flux & Solder Co. of America, 1965 E. 66th, Cleveland, O.
Sta-Warm. See Beckwith Machine Co.
Superior Elec. Products Corp., 1300 S. 13th, St. Louis, Mo.
Swartzbaugh Mfg. Co., 1501 W. Bancroft, Toledo, O.
Torrid. See Beardsley & Wolcott Mfg. Co.
Trent, Harold E., 439 N. Twelfth, Philadelphia, Pa.
Varick Elec. Mfg. Co., 28 E. 21st St., New York, N. Y.
Vulcan Elec. Heating Co., 225 Varick, New York, N. Y.
Waage Elec. Co., 5100 W. Ravenswood Ave., Chicago, Ill.
Ward Mfg. Co., 937 Wellington Ave., Chicago, Ill.
Watlow Elec. Mfg. Co., 1320 N. 23rd, St. Louis, Mo
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SOLVENTS & REDUCERS, VARNISH. See Paint, Varnish, Lacquer.
SPAGHETTI. See Tubing, Varnished Fabric.
SPEED CHANGING UNITS. See Gears (Speed Changing Units).
SPEED INDICATORS. See Tachometers.
SPOOLING MACHINES, WIRE. See Wire Manufacturing Machines.

SPRAYING OUTFITS
Airmods. See Reliable Mfg. Co.
Airway. See Binks Spray Equip. Co.
Atomister Corp., 21 Hamilton, Rahway, N. J.
Beach Air Brush Co., Willard C., Second & Warren, Harrison, N. J.
Binks Mfg. Co., 3114 Carroll Ave., Chicago, Ill.
Breuer Electric Mfg. Co., 852 Blackhawk, Chicago, Ill.
De Vilbiss Co., 3750 Detroit Ave., Toledo, Ohio.
Eclipse Air Brush Co., 79 Orange, Newark, N. J.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Electric Sprayit Co., 320 E. Colfax Ave., South Bend, Ind.
Eureka Sprayers, Inc., 87-28 130th, Long Island City, N. Y.
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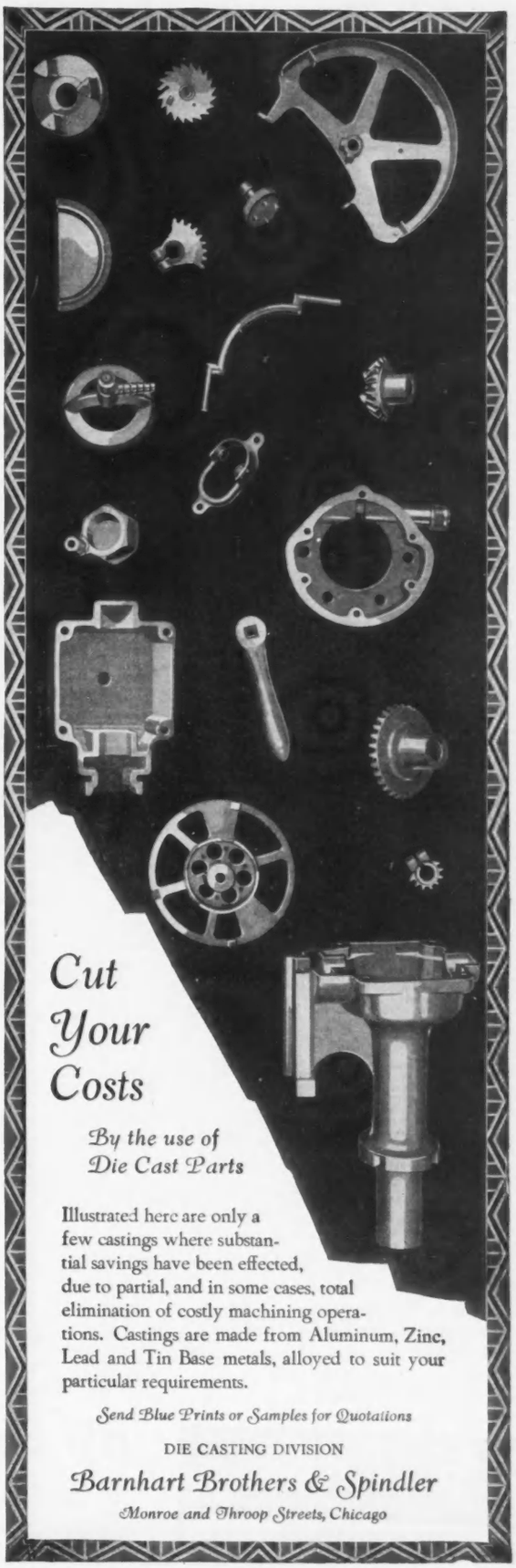

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Koch Bros. Mfg. Co., 2339 Nelson, Chicago, Ill.
K B. See Koch Bros. Mfg. Co.
Metal Specialties Mfg. Co., 338 N. Kedzie Ave., Chicago.
Macleod Co., 2232 Bogen, Cincinnati, O.
Matthews Corp., W. N., 3722 Forest Park Blvd., St. Louis, Mo.
Peascie Air Brush Co., 1909 Diversey Parkway, Chicago, Ill.
Paint-O-Mister. See Atomister Corp.
Pioneer Air Compressor Co., 243 Canal, New York, N. Y.
Presto. See Metal Specialties Mfg. Co.
Reliable Mfg. Co., Dwightway & Fourth St., Berkeley, Cal.
Sharpe Mfg. Co., 1356 S. Flower, Los Angeles, Cal.
Simons Paint Spray Brush Co., 17 Maryland Ave., Dayton, O.
Stumpfel Spray Equipment Co., 552 W. Lake, Chicago, Ill.
Spraco, Inc., Somerville, Mass.
Spray-All. See United States Air Compressor Co.
Sprayit. See Electric Sprayit Co.
United States Air Compressor Co., 5300 Howard Ave., Cleveland, O.
Weld Air Brush Mfg. Co., 2173 N. California Ave., Chicago, Ill.
SPREADERS, COIL & LOOP. See Winding Machines. Armature & Field Coil.

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American Spiral Spring & Mfg. Co., Arsenal Sta., Pittsburgh, Pa.
American Spring & Mfg. Co., Holly, Mich.
Barnes Co., Wallace, Bristol, Conn.
Barnes-Gibson-Raymond, Inc., 6400 Miller Ave., Detroit.
Cary Spring Works, Inc., 240 W. 29th St., New York, N. Y.
Cleveland Wire Spring Co., Cleveland, O.
Cook Spring Co., Ann Arbor, Mich.
Cuyahoga Spring Co., Berea Rd., Cleveland, O.
Dunbar Bros. Co., Bristol, Conn.
Eureka Tinware Mfg. Co., 135 W. 20th, New York, N. Y.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Flexo Spring Mfg., Inc., 44 South First, Brooklyn, N. Y.
Gibson Co., Wm. D., 1400 Clybourn Ave., Chicago, Ill.
Hubbard Spring Co., M. D., Pontiac, Mich.
Humason Mfg. Co., Forestville, Conn.
Hunter Pressed Steel Co., Lansdale, Pa.
Kokomo Spring Co., Kokomo, Ind.
Lee Spring Co., 34 Main, Brooklyn, N. Y.
Mattatuck Mfg. Co., Waterbury, Conn.
Miller & Van Winkle, Inc., 18 Bridge, Brooklyn, N. Y.
Newcomb Spring Corp., 234 40th, Brooklyn, N. Y.
Peck Spring Co., Plainville, Conn.
Peterson Spring Co., 1660 Beard Ave., Detroit, Mich.
Rapid Spring Co., 222 Second Ave., Pittsburgh, Pa.
Raymond Mfg. Co., Corry, Pa.
Standard Spring and Manufacturing Co., 236-42nd St. Brooklyn, N. Y.
Steitzen & Co., 297 Washington, Newark, N. J.
Yost Superior Co., Springfield, O.
Young Industries, Inc., L. A., Detroit, Mich.

STAMPED BOXES. See Cabinets, Sheet Steel.

STAMPINGS, Fibre. See Fibre.
Sheet Metal. See Fixture Fittings.
Sheet Steel. See Stampings, Sheet Steel.
Small. See Stampings, Small.

STAMPINGS, Sheet Steel
Heavy Stamping and Drawing.
Acklin Stamping Co., 1925 Nebraska, Toledo, O.
American Stamping Co., 978 E. 64th, Cleveland, O.
Bartlett-Thompson Co., 67 Sudbury, Boston, Mass.
Benjamin Mfg. Co., Des Plaines, Ill.
Bossert Corp., 1002 Oswego St., Utica, N. Y.
Challenge Stamping & Porcelain Co., Grand Haven, Mich.
Detroit Metal Specialty Co., 1651 Beard, Detroit, Mich.
Eureka Tinware Mfg. Co., 135 W. 20th, New York, N. Y.
Faries Mfg. Co., Decatur, Ill.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y.
Geuder, Paeschke & Frey, 1392 St. Paul Ave., Milwaukee.
Hubbard & Co., 6301 Butler, Pittsburgh, Pa.
Hunter Pressed Steel Co., Lansdale, Pa.
Janney, Jr., Joseph A., 1421 Chestnut St., Philadelphia.
Lansing Stamping Co., Lansing, Mich.
Massachusetts Machine Shop, Inc., Boston, Mass.
Mathews Mfg. Co., 104 Gold, Worcester, Mass.
Metal Specialty Co., 1553 Riverside Drive, Cincinnati, O.
Metropolitan Devices Corp., 1250 Atlantic Ave., Brooklyn
Mullins Mfg Corp., Salem, Ohio. (Vitreous Enameled.)
New England Pressed Steel Co., Natick, Mass.
Seymour Products, Seymour, Conn.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
Truscon Steel Co., Youngstown, O.
United States Stamping Co., Moundsville, W. Va.
Worcester Stamped Metal Co., Worcester, Mass.

STAMPINGS, Small
Small Stamped Metal Parts for Electrical Devices
Aerial Machine & Tool Co., 79 Grand, New York, N. Y.
American Radio Hardware Co., 135 Grand, New York, N. Y.
American Stamping Co., 978 E. 64th, Cleveland, O.
Arrow Automatic Products Corp., 27 Vestry, New York, N. Y.
Barnes Co., Wallace, Bristol, Conn.
Beaver Mfg. Co., 625 N. Third, Newark, N. J.
Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Bull Dog Electric Products Co., Detroit, Mich.
Chase Brass & Copper Co., Waterbury, Conn.
Cinch Mfg. Corp., 2335 W. Van Buren, Chicago, Ill.
Clarke Metal Products, Inc., 490 Hancock Ave., Bridgeport, Conn
Detroit Metal Specialty Co., 1651 Beard, Detroit, Mich.
Diamant & Tool Mfg. Co., 401 Mulberry, Newark, N. J.
Elco Tool & Screw Corp., 1818 Broadway, Rockford, Ill.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J.
Faries Mfg. Co., Decatur, Ill.
Fischer Spring Co., Chas., 238 Kent Ave., Brooklyn, N. Y
Geuder, Paeschke & Frey, 1392 St. Paul Ave., Milwaukee.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Gray Bros. Co., Plano, Ill.
Great Lakes Pressed Steel Corp., 1410 Niagara, Buffalo, N. Y.
Hubbard Spring Co., M. D., Pontiac, Mich.
Hubbell, Inc., Harvey, Bridgeport, Conn.
Humason Mfg. Co., Forestville, Conn.
Hunter Pressed Steel Co., Lansdale, Pa.
Imperial Electrical Co., Union City, Ind
Klein Elec. & Mfg. Co., 143½ Young, Tonawanda, N. Y.
Kirschner's Mfg. Co., 259 Calyer, Brooklyn, N. Y.
Lansing Stamping Co., Lansing, Mich.
Lenz Metal Stamping Wks., J., 199 Franklin, New York.
Marion Elec. Mfg. Co., 24 Cliff, Jersey City, N. J.
Massachusetts Machine Shop, Inc., Boston, Mass.
Mathews Mfg. Co., 104 Gold, Worcester, Mass.
Mattatuck Mfg. Co., Waterbury, Conn.
McDowell Mfg. Co., Millvale Sta., Pittsburgh, Pa.
Mechanics Tool & Stamping Co., 7 Summer, Worcester, Mass
Melaun Mfg. Co., 144 E. Morris, Indianapolis, Ind.
Monowatt Electric Corp., 24 W. 40th, New York, N. Y.
Mutual. See Bull Dog Elec. Products Co.
Patton-MacGuyer Co., Providence, R. I.
Paul & Beekman Mfg. Co., 1734 N. Fifth, Philadelphia, Pa
Plume & Atwood Mfg. Co., 474 Bank, Waterbury, Conn
Precision Metal Workers, 3100 Carroll Ave., Chicago, Ill.
Premax Products, Inc., 230 Tenth, Niagara Falls, N. Y.
Quadriga Mfg. Co., 213 W. Grand Ave., Chicago, Ill.
Ribaysen Mfg. Co., J., 4442 Roosevelt Rd., Chicago, Ill.
Risdon Mfg. Co., Naugatuck, Conn.
Russell Mfg. Co., John M., Naugatuck, Conn.
Schollhorn Co., Wm., New Haven, Conn.
Scovill Mfg. Co., Waterbury, Conn
Sharples Separator Co., Riddle & Patten Ave., Westchester, Pa.
Sherman Mfg. Co., H. B., Battle Creek, Mich.
Signal Elec. Mfg. Co., Menominee, Mich.
Sosa Mfg. Co., Roselle, N. J.
Steinen & Co., 297 Washington, Newark, N. J.
Thomas & Skinner Steel Products Co., 1102 E. 23rd, Indianapolis, Ind.
United States Stamping Co., Moundsville, W. Va.
Valley Appliances, Inc., 634 Lexington Ave., Rochester, N. Y.
Waterbury Brass Goods Corp., Waterbury, Conn.
Waterbury Button Co. (Elecl. Mfg. Div.), Waterbury, Conn.
Western Cartridge Co., East Alton, Ill.
Worcester Stamped Metal Co., Worcester, Mass.
Zierick Machine Wks., F. R., 68 E. 131st St., New York, N. Y.

STANDS, Armature
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17 & Cambria Sts., Philadelphia, Pa.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn
Peerless. See Electric Service Supplies Co.
Ridlon Company, Frank, Boston, Mass.
Weidenhoff, Joseph, 4352 Roosevelt Rd., Chicago, Ill.

STARTERS, Motor. See Controllers, Motor; Switches, Remote Control; Switches, Knife; Safety; Switches, Snap (Heavy Duty).
STEATITE. See Cores, Resistance Coil.
STEEL CASTINGS. See Castings, Steel.

STEEL for Electric Appliances
Elyria Iron & Steel Co., Elyria, O.
Ryerson & Son, Jos., 2558 W. 16th, Chicago, Ill.

STEEL, Magnet
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hercules Elec. Steel Corp., 145 Lafayette St., New York.
Ludlum Steel Co., Watervliet, N. Y.
Reid Co., Jr., David, 85 Adams, Brooklyn, N. Y.
Swedmag. See Reid Co., Jr., David.

STEEL SHEETS
Agathon. See Republic Iron & Steel Co.
Allegheny Steel Co., Brackenridge, Pa.
American Sheet & Tin Plate Co., Frick Bldg., Pittsburgh.
Armco. See International Corp., Middletown, O.
Armelec. See Empire Steel Corp.
Cyclops Steel Co., Titusville, Pa.
Dynelec. See Empire Steel Corp.
Empire Steel Corp., Mansfield, O.
Firth-Sterling Steel Co., McKeesport, Pa
Follansbee Bros. Co., Third & Liberty, Pittsburgh, Pa.
Manelec. See Empire Steel Corp.
Metelec. See Empire Steel Corp.
Newport Rolling Mill Co., Newport, Ky.
Polelec. See Empire Steel Corp.
Republic Iron & Steel Co., 335 Market, Youngstown, O.
Tranelec. See Empire Steel Corp.
Unilov. See Universal Steel Co.
Universal Steel Co., Bridgeville, Pa.
Wheeling Steel Corp., Wheeling, W. Va.
STEEL, STRIP. See Strip Steel.

STOCKS, Dies and Reamers
Hall-Will, Inc., Twelfth & Cranberry, Erie, Pa.
Red-E-Hall. See Hall-Will, Inc.
Toledo Pipe Threading Machine Co., 1445 Summit, Toledo, O.

STONES, Commutator
Acme. See Green Equipment Corp.
Caro. See Electric Service Supplies Co.
Cleveland Stone Co., Union Trust Bldg., Cleveland, O.
Co-operative Utilities Co., 1503 Columbia Ave., Philadelphia, Pa.
Diamond Dee. See Co-operative Utilities Co.
Electric Service Supplies Co., 17th and Cambria, Philadelphia, Pa.
Green Equipment Corp., 260 Monadnock Block, Chicago, Ill.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Electric Co.
Lombard & Co., Somerville, Mass.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, O.

STOOLS, Factory; Steel
Angle Steel Stool Co., Plainwell, Mich.
Chicago Wire Chair Co., 613 N. La Salle, Chicago, Ill.
Royal Metal Mfg. Co., 1140 South Michigan Ave., Chicago.

STORAGE
Battery Plates. See Plates, Storage Battery.
Battery, Separators. See Separators.
Tools. See Tools, Storage Battery.

STRAINING MACHINES, INSULATION. See Wire Manufacturing Machines.

STRAIGHTENERS, Armature Shaft
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

STRANDING MACHINES. See Wire Manufacturing Machines.

STRIP STEEL
(Hot and Cold Roll).
Acme Steel Co., 2832 Archer Ave., Chicago, Ill. (Hot & Cold).
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill. (Cold).
Athenia Steel Co., 135 William, New York, N. Y. (Cold)
Barnes Co., Wallace, Bristol, Conn. (Hot.)
Griffin Mfg. Co., Huron & Cherry, Erie, Pa. (Cold.)
Laclede Steel Co., Arcade Bldg., St. Louis, Mo. (Hot.)
Latrobe Electric Steel Co., Latrobe, Pa. (Hot & Cold.)
Republic Iron & Steel Co., 335 Market, Youngstown, O.
Sharon Steel Hoop Co., Sharon, Pa. (Hot.)
Stanley Wks., New Britain, Conn. (Hot & Cold.)
Steel and Tubes, Inc., Cleveland, O. (Hot & Cold.)
Superior Steel Corp., 3122 Grant Bldg., Pittsburgh, Pa. (Hot & Cold.)
Thomas Steel Co., Warren, Ohio.
West Leechburg Steel Co., Farmers Bank Bldg., Pittsburgh, Pa. (Hot & Cold.)

STRIPPERS, Wire
Acme. See A. Laubscher.
Artos Engineering Co., 115 Brown, Milwaukee, Wis. (Cutting, Stripping and Measuring).
Austin Co., M. B., 108 S. Desplaines, Chicago, Ill.
Carlander, Henry, 508 W. 146th, New York, N. Y.
Colonial-Premier Co., 229 W. Ohio, Chicago, Ill.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
E-Z. See Pyramid Products Co.
F. F. See France Mfg. Co.
France Mfg. Co., 10306 Berea Rd., Cleveland. (Motor Driven.)
Goebel. See Klein & Son.
Hertman. See Service Sales & Mfg. Co.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Ives Mfg. Co., Meriden, Conn.
Klein & Sons, Mathias, Chicago, Ill.
Laubscher, A., 77 Fort Pleasant Ave., Springfield, Mass.
Perfection. See Weber Machine Corp.
Pyramid Products Co., 2311 S. State, Chicago, Ill.
Service Sales & Mfg. Co., 3405 W. 159th, Cleveland, O.
speedcraft. See Wire Stripper Co.
Thomas Steel Products Co., Warren, Ohio.
Weber Machine Corp., 33 S. Water, Rochester, N. Y.
Wire Stripper Co., 507 Erie Bldg., Cleveland, O. (Motor Driven Wire Stripper & Wire Twister.)
Zierick Machine Wks., F. R., 6 Howard, New York City. (Motor Driven Stripper & Twister).

SWITCHBOARD INSTRUMENTS. See Instruments, Portable and Switchboard.
SWITCHBOARD OPALS. See Lenses.
SWITCHBOARDS, SLABS AND BARRIERS
See Asbestos Slabs; Molded Insulation; Slate; Soapstone.

SWITCH (Switches)
Arms. See Posts, Binding.
"Across the Line" Type. See Controllers, Motor.
Baby Knife. See Switches, Battery.
Battery. See Switches, Battery.
Canopy. See Switches, Snap.
Clock Operated. See Switches, Time.
Feed Through. See Switches, Snap.
Fixture. See Switches, Snap.
Float. See Switches, Tank.
Flush. See Switches, Snap.
Handles. See Handles, Wood
Knife, Baby. See Switches, Battery & Baby Knife.
Lever Radio. See Radio Mounting.
Lever. See Switches, Snap, Lever.
Limit. See Controllers, Motor.
Mercury. See Switches, Mercury
Motor Starting. Magnetic Type. See Controllers.
Motor Starting. Non-Magnetic. See Switches, Motor Starting.
Pendant. See Switches, Snap.
Pressure Regulating. See Controllers.
Push Button, Snap. See Switches, Snap.
Push Button, Motor Starting. See Switches, Remote Control.
Radio Receiver. See Radio Mountings.
Range. See Switches Snap; Heavy Duty
Remote Control. See Switches, Remote Control.
Reversing. See Controllers.
Rotary. See Switches, Snap.
Safety. See Switches, Knife.
Snap. See Switches, Snap.
Starter Type. See Controllers.
Storage Battery. See Switches, Storage Battery
Surface. See Switches, Snap.
Tank. See Switches, Tank
Time. See Switches, Time.
Toggle. See Switches, Snap.
Tumbler. See Switches, Snap.

SWITCHES, Battery and Baby Knife
Cut-Out Switches.
Anti-Wood. See Keil & Son, Francis.
Bridgeport Switch Co., 209 Center, Bridgeport, Conn.
Bryant Electric Co., Bridgeport, Conn
General Electric Vapor Lamp Co., 889 Adams, Hoboken, N.J.
Jefferson Electric Co., 1503 S. Laflin, Chicago, Ill.
Circle T. See Trumbull Elec. Mfg. Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn.
Crown. See Edwards & Co., Inc.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Diamond H. See Hart Mfg. Co.
Edwards & Co., Inc., 140th & Exterior, New York, N. Y.
Electrad, Inc., 428 Broadway, New York, N. Y.
Eureka. See Frank W. Morse & Co.
Fahnestock Elec. Co., cor. East Ave. and 8th, Long Island City, N. Y.
Handy. See Chicago Elec. Mfg. Co.
H. & H. See Hart & Hegeman Div.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co. Hartford, Conn. (Push Button.)
Harwood. See Frank W. Morse & Co.
Heinemann Elec. Co., Trenton, N. J.
Jefferson Elec. Co., 1500 S. Laflin, Chicago, Ill.
Leat. See Frank W. Morse & Co.
Kappa. See Trumbull Elec. Mfg. Co.
Keil & Son, Francis, 401 E. 163rd, New York, N. Y.
Kendrick & Davis Co., Lebanon, N. H.

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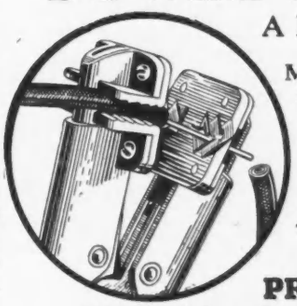

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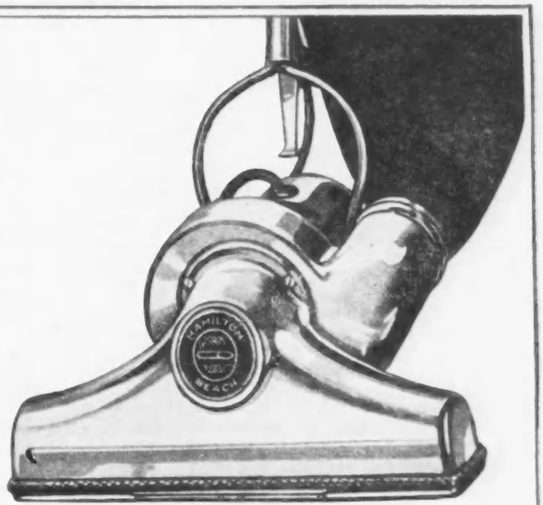

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30

Small Metal Stampings Accurately Made

PATTON-MacGUYER CO. — Providence, R. I.

SWITCHES, Battery—Continued
Keystone. See Frank W. Morse & Co.
King Mfg. Co., B. C., 302 Park Ave., Brooklyn, N. Y.
Knox Porcelain Corp., Knoxville, Tenn.
K-P-F Elec. Co., 855 Howard St., San Francisco, Cal.
Leviton Mfg. Co., 226 Newell, Brooklyn, N. Y.
Lyons Mfg. Co. (Mt. Carmel), New Haven, Conn.
Morse Co., Frank W., Boston, Mass.
Partrick & Wilkins Co., Philadelphia, Pa.
Porcelain Products, Inc., Findlay, Ohio.
Powerlite Switchboard Co., 4149 E. 79th, Cleveland, O.
Reliable Electric Co., 3145 Carroll Ave., Chicago, Ill.
Samson Electric Co., Canton, Mass.
Spero Elec. Mfg. Co., E. 33rd and Woodland Ave., Cleveland
Sta-Rite. See Frank W. Morse & Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Wood Elec. Co., C. D., 565 Broadway, New York, N. Y.

SWITCHES, Mercury

(For Temperature Control Apparatus.)
Con-Tac-Tor. See Time-O-Stat Controls Co.
Dunco. See Struthers Dunn, Inc.
General Electric Vapor Lamp Co., 883 Adams, Hoboken, N. J.
General Kontrolar Co., 200 E. First, Dayton, O.
Hywatt. See Time-O-Stat Controls Co.
Leland Electric Co., Dayton, O.
Kontax. See General Kontrolar Co. & Leland Electric Co.
Kontrolar. See General Kontrolar & Leland Electric Co.
Machlett & Son, 50 William, Long Island City, N. Y.
Mercoid Corp., 4201 Belmont Ave., Chicago, Ill.
Safety Regulator Co., 529 S. Mathews, Los Angeles, Cal
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Time-O-Stat Controls Co., Elkhart, Ind.

SWITCHES, Motor Starting

Aces. See Colt's Patent Fire Arms Mfg. Co.
Adam Elec. Co., Frank, St. Louis, Mo.
Automatic Switch Co., 154 Grand, New York, N. Y.
Barber Elec. Mfg. Co., North Attleboro, Mass.
Bull Dog Electric Products Co., Detroit, Mich.
Circle T. See Trumbull Elec. Mfg. Co.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.
Columbia Metal Box Co., 226 E. 144th, New York, N. Y.
Crouse-Hinds Co., Syracuse, N. Y.
E. W. See Trumbull Elec. Mfg. Co.
FA. See Adam Elec. Co., Frank.
F. A. Triumph. See Metropolitan Elec. Mfg. Co.
Federal Steel Products Co., 2 Ave. L., Newark, N. J.
Large-Dall Mfg. Co., 311 N. Tenth, Philadelphia, Pa.
Leonard Elec. Mfg. Co., 2907 Perkins Ave., Cleveland, O
Lundy Co., E. A., Fulton Bldg., Pittsburgh.
MacMillen Mfg. Co., 1400 N. Spring, Los Angeles, Cal.
Major. See Adam Elec. Co., Frank.
Metropolitan Device Corp., 1250 Atlantic Ave., Brooklyn, N. Y.
Metropolitan Elec. Mfg. Co., Blvd. at 14th, Long Island City, N. Y.
Murray. See Metropolitan Device Corp.
Mutual. See Bull Dog Elec. Products Co.
Naro. See Metropolitan Elec. Mfg. Co.
Noark. See Colt's Patent Fire Arms Mfg. Co.
Nublade. See Colt's Patent Fire Arms Mfg. Co.
Palmer Elec. & Mfg. Co., Waltham, Mass.
Robbins & Myers, Inc., Springfield, O.
Safelock. See Westinghouse Elec. & Mfg. Co.
Schmuckler & Sons, 2232 N. 28th, Philadelphia, Pa.
Square D Co., Detroit, Mich.
Switchfuz. See Adam Elec. Co.
S. S. See Wadsworth Elec. Mfg. Co.
Tanner & Co., Wm. F., 511 Sharp, Baltimore, Md.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Trumbull-Vanderpoel Elec. Mfg. Co., Bantam, Conn.
Unisafti See Metropolitan Device Corp.
Unit-Versal See Bull Dog Elec. Products Co.
Universal Metal Box & Products Co.
V. V. Fittings Co., 711 Cherry, Philadelphia, Pa.
Wadsworth Elec. Mfg. Co., Covington, Ky.
Westinghouse Elec. & Mfg. Co., Mansfield, O.

SWITCHES, Remote Control

Push Button, Magnetically Operated.
Adam Electric Co., Frank, St. Louis, Mo.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Automatic Switch Co., 154 Grand, New York, N. Y.
Automatic Temperature Control, 34 E. Logan, Philadelphia.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Clark Controller Co., 1148 E. 152nd, Cleveland, O.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Diamond H. See Hart Mfg. Co.
Darrin. See Automatic Switch Co.
Dunco. See Struthers Dunn, Inc.
Electric Valve Mfg. Co., 64 Murray, New York, N. Y.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hart Mfg. Co., Hartford, Conn.
H P. See Palmer Elec. & Mfg. Co.
Industrial Controller Div. of Square Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Kato Engr. Co., Mankato, Minn.
Lincoln Elec. Co., Coit Rd. & Kirby Ave., Cleveland, O.
Major, F. A., System. See Adam Elec. Co.
Monitor Controller Co., 51 S. Gay, Baltimore, Md.
Palmer Elec. & Mfg. Co., Waltham, Mass.
Precise Mfg. Co., 254 Mill, Rochester, N. Y.
Protectoswitch. See Precise Mfg. Co.
R. O. C. See South Bend Current Controller Co.
Ross Safety Switch Corp., 1 E. 42nd, New York, N. Y.
Signal Engineering & Mfg. Co., 148 W. 14th, New York.
South Bend Current Controller Co., 247 La Porte, South Bend, Ind.
States Co., 19 New Park Ave., Hartford, Conn.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa.
Takamine Corp., 208 Rawson St., Long Island City, N. Y.
Teeple Co., L. R., 540 E. Ninth, Portland, Ore.
Triplock. See Monitor Controller Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Zenith Elec. Co., 537 S. Dearborn, Chicago, Ill.

SWITCHES, Snap

	KEY
Feed Through	See p
Fixture (Canopy, Candelabra and Key Arm)	See F
Flush	See f
Lever, Toggle, Tumbler	See L
Pendant	See p
Push Button	See P
Rotary	See R
Surface	See s

See Also Switches, Snap; Heavy Duty.
Adam Electric Co., Frank, St. Louis, Mo. f . . . . . F
Anylite Elec. Co., 200 Murray, Ft. Wayne, Ind.
Arrow Electric Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn. . . f sp P R L F
Arrow Head. See Arrow Elec.
Beaver Mfg. Co., 625 N. Third, Newark, N. J. . . . . f p P . . . F
Best. See United States Elec. Mfg. Corp.

Brascolite. See Guth & Co., Edwin.
Bremer Elec. Mfg. Co., 139 N. 7th, Philadelphia, Pa. . . . . f . . . . . .
Bridgeport Switch Co., 209 Center, Bridgeport, Conn. . . . . L F
Bryant Elec. Co., Bridgeport, Conn. . . . . f sp P R L F
B. S. Co. See Bridgeport Switch Co.
Carling Tool && Machine Co., 618 Capitol Ave., Hartford, Conn. . . . . F
Commercial. See Gaynor Electric Co.
Connecticut Elec. Mfg. Co., Bridgeport, Conn. . . . . p P R L F
Crouse-Hinds Co., Syracuse, N. Y. . . . . L .
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee, Wis. . . . . P . . . L . .
Diamond H. See Hart Mfg. Co.
Dugle. See Bryant Elec. Co.
Gaynor Elec. Co., Stratford, Conn. . . . . f . . . . . L . .
General Elec. Co., Bridgeport, Conn. . . . . f sp P R L F
Glo-Guide. See Bryant Elec. Co.
Gold Star Push Switch. See Hart & Hegeman.
Guth & Co., Edwin, 2625 Washington Ave., St. Louis, Mo. . . . . F
Hart Mfg. Co., Hartford, Conn. . . . . f sp P R L . .
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co. (Door Bolt Control) f sp P R L F
Hart. See Hart & Hegeman.
H. & H. See Hart & Hegeman Mfg. Co.
Hubbell, Inc., Harvey, Bridgeport, Conn. . . . sp . . . . L F
Keil & Son, Francis, 401 E. 163rd, New York, N. Y. . . . . f . . P . . . . .
Leviton Mfg. Co., 226 Newell, Brooklyn . . . . . F
Levolier. See McGill Mfg. Co.
McGill Mfg. Co., Valparaiso, Ind. . . . . f . . . . . L F
Marks Products Co., 80 N. Ninth, Brooklyn, N. Y. . . . . L F
Metropolitan Elec. Mfg. Co., Blvd at 14th St., Long Island City, N. Y. . . . . s . . R . . .
Morse Co., Frank W., 291 Congress, Boston . . . P . . . . . .
National. See Standard Elec. Mfg. Co.
New England. See Paulding, John L.
Nutmeg. See Hubbell, Harvey, Inc.
Pass & Seymour, Solvay Sta., Syracuse, N. Y. . . . . f sp P . . L F
Paulding, John I, New Bedford, Mass. . . . f s . P . . . . .
Pen Tap. See Beaver Mfg. Co.
Perkins. See Bryant Elec. Co.
Pilot Radio & Tube Corp., 323 Berry, Brooklyn, N. Y. . . . . L . .
Pilotoggle. See Pilot Radio & Tube Corp.
Pilotoggle. See Pilot Elec. Mfg. Co.
Pullrite. See Morse, Frank W.
Rodale Mfg. Co., 200 Hudson, New York p . . . . . .
Sears, Henry D., 80 Boylston, Boston . . f sp P R L F
Smith & Co., T. C., 3915 Pewelton Ave., Philadelphia, Pa. . . . . P . . . . .
Snapit. See Marks Products Co.
Spartan. See Bryant Elec. Co.
Standard Elec. Mfg. Co., 941 Wrightwood Ave., Chicago, Ill. . . . . f . P R L . .
Starlite. See Morse Co., Frank W.
Trigle. See Bryant Elec. Co.
Tumbolier. See Hart & Hegeman.
Twi-Lite. See McGill Mfg. Co.
United States Elec. Mfg. Corp., 222 W. 114th, New York, N. Y. . . . . f . . . . . .
Victor. See Keil & Son, Francis.
Washington. See Gaynor Electric Co.
Weber. See Sears, Henry D.
Yankee. See Bryant Elec. Co.

SWITCHES, Snap; Heavy Duty

Heavy duty rotary snap switches for Electric Range and Small Motor Control.
Arrow Elec. Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.
Bryant Electric Co., 1421 State, Bridgeport, Conn.
Diamond H. See Hart Mfg. Co.
Domestic Electric Co., Kent, O.
General Electric Co., Section W-234, Merchandise Dept., Bridgeport, Conn.
Hart Mfg. Co., Hartford, Conn.
Hart & Hegeman, Div. of Arrow-Hart & Hegeman Elec. Co., Hartford, Conn.

SWITCHES, Storage Battery; Automatic Disconnecting

Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
Penn Electric Switch Co., E. 20th & Walnut Sts., Des Moines, Ia.
Radioloc. See Cutler-Hammer Mfg. Co.

SWITCHES, Tank

Anderson & Co., C. J., 212 W. Austin Ave., Chicago, Ill.
Blackburn-Smith Corp., 25 W. 45th, New York, N. Y.
Cutler-Hammer, Inc., 1288 St. Paul Ave., Milwaukee.
General Electric Co., Schenectady, N. Y.
Industrial Controller Div. of Square Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Ostrander Elec. Wks., W. R., 911 Atlantic Ave., Brooklyn.
Penn Elec. Switch Co., 20th & Walnut, Des Moines, Ia.
Roberts & Kanze Elecl. Repair Co., 240 W. 25th, New York.
Sundh Elec. Co., 209 Parkhurst, Newark, N. J.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

SWITCHES, Time (Automatic Clock Operated Switches)

Anderson Mfg. Co., Albert & J. M., 289 A, Boston, Mass.
Astrachron. See Gen. Engineering Co.
Automatic Elec. Mfg. Co., Mankato, Minn.
Automatic Lighting Co., 831 Greenmount Ave., Baltimore.
Brown & Pengilly, Inc., 1264 Folsom, San Francisco, Cal.
Buckeye Time Switches, Inc., 1557 St. Clair Ave., Cleveland, O.
Campbell Electric Mfg. Co., 15 Stewart, Lynn, Mass.
Cramer & Co., R. W., 136 Liberty, New York, N. Y.
Electric Steam Radiator Co., 513 Stewart, Seattle, Wash.
Eureka Tool & Machine Co., 42 Walnut, Newark, N. J.
Frisch, Walter P., 104 Linden, Rochester, N. Y.
Gem Engineering Co., Hempstead, N. Y.
General Electric Co., Schenectady, N. Y.
Go-N-Set. See G. & S. Research Lab.
G. & S. Research Laboratory, 1269 Cochran Ave., Los Angeles, Cal.
Hart Mfg. Co., Hartford, Conn.
Horni Signal Mfg. Co., 290 Hudson, New York, N. Y.
Horolectrical Corp., 216 W. 14th, New York, N. Y.
Jewel. See Time Switch Sales & Service.
Kwixset. See Thompson Clock Co.
Lamp-Lighter. See Robbins & Myers Co.
Liberty Bell Mfg. Co., Minerva, Ohio.
Mercury Time Switch Co., Marine City, Mich.
Northwestern Clock Co., 515 Brown Bldg., Omaha, Neb.
Paragon Elec. Co., 407 S. Dearborn, Chicago, Ill.
Racine. See Reliance Automatic Ltg. Co.
Radio Owl, 2269 E. 51st, Los Angeles, Cal.

Radio Switchman. See R-V Mfg. Co.
Reliance Automatic Ltg. Co., 1925 Meade, Racine, Wis.
Research Mfg. Laboratory, 1269 Cochran Ave., Los Angeles.
Robbins & Myers Co., Springfield, O.
Ross Safety Switch Corp., 1 E. 42nd, New York, N. Y.
R-V Mfg. Co., Marshfield, Mass.
Sauter. See Cramer & Co.
Sentinel. See Electric Steam Radiator Co.
Stat-Amatic Instrument & Appliance Co., Hartford, Conn.
States Co., Hartford, Conn.
Stromberg Electric Co., 223 W. Erie, Chicago, Ill.
Thompson Clock Co., H. C., Bristol, Conn.
Time Switch Sales & Service, 1841 Euclid Ave., Cleveland.
Tork Clocks, Inc., 12 E. 41st, New York, N. Y.
Walser Automatic Timer Co., 405 Lexington Ave., New York. (Also Coin Operated.)
X-L Radio Laboratories, 1224 Belmont Ave., Chicago, Ill. (Timer.)
Zenith Elec. Co., 537 S. Dearborn, Chicago, Ill.

TACHOMETERS

Speed Indicators, Speedometers, Revolution Counters.
Biddle, James G., 1211 Arch, Philadelphia, Pa.
Brown Instrument Co., Wayne & Windrim, Philadelphia.
Comet Elec. Co., 47 Union Trust Bldg., Indianapolis, Ind.
Durant Mfg. Co., 655 Buffum, Milwaukee, Wis.
Electric Tachometer Corp., Spring Garden & Broad Sts., Philadelphia, Pa.
Holtzer-Cabot Elec. Co., Boston, Mass.
Leeds & Northrup Co., 4901 Stenton Ave., Philadelphia, Pa.
Misener Mfg. Co., 326 E. Washington, Syracuse, N. Y.
Productimeter. See Durant Mfg. Co.
Standeo. See Sticht & Co.
States Co., 19 New Park Ave., Hartford, Conn.
Sticht & Co., H. R., 13 Park Row, New York, N. Y.
Veeder Mfg. Co., 14 Sargeant, Hartford, Conn.
Weston Elecl. Instrument Co., 582 Freilinghuysen Ave., Newark, N. J.
Zernickow Co., O., 15 Park Row, New York, N. Y.

TAGS, Cable; Pole and Battery

American Radio Hardware Co., 135 Grand, New York, N. Y. (Battery Lead Tags.)
Benedict Mfg. Co., East Syracuse, N. Y.
Brooklin Underground Elec'l Mfg. Co., Glenside, Pa.
Crowe Name Plate & Mfg. Co., 1749 Grace, Chicago, Ill.
Grammes & Sons, Inc., L. F., Allentown, Pa.
International Tag Co., 319 N. Whipple, Chicago, Ill.
Matthews & Co., Jas. H., 3942 Forbes, Pittsburgh, Pa.
Premax Products, Inc., 230 Tenth, Niagara Falls, N. Y.
Viking Tool & Machine Co., 745 65th, Brooklyn, N. Y.
Waterbury Button Co. (Elecl. Mfg. Dept.), Waterbury Conn.

TAGS, Shipping

Campbell Paper Box Co., 904 S. Main, South Bend, Ind.
International Tag Co., 319 W. Whipple, Chicago, Ill.

TAMPING TOOLS, COIL. See Tools, Commutator Truing.

TANK SWITCHES. See Switches, Tank.

TANKS, OIL SWITCH & BREAKER. See Cabinets, Sheet Steel.

TANKS, TINNING. See Wire Manufacturing Machines.

TANTALUM

Fansteel Products Co., Inc., North Chicago, Ill.

TAPE, Asbestos

American Asbestos Co., Norristown, Pa.
Asbestos Fibre Spinning Co., North Wales, Pa.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
General Asbestos & Rubber Co., Charleston, S. C.
Johns-Manville Corp., New York, N. Y.
Matthews & Co., Jas. H., 3942 Forbes, Pittsburgh, Pa.
Micalite. See Mitchell-Rand Mfg. Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Niagrite. See Johns-Manville, Inc.
Shield Brand. See Mitchell-Rand Mfg. Co.

TAPE, Cotton, Linen, Silk; Tape, Sleeving, Webbing.

Anchor Webbing Co., 300 Brook, Pawtucket, R. I. (Cotton, Silk).
Awabco. See Anchor Webbing Co.
Eagle. See Sidebotham, Inc., John.
General Electric Co., Schenectady, N. Y.
Gilmer Co., L. H., Cottman & Keystone Sts. (Tacony) Philadelphia, Pa.
Hope Webbing Co., 1005 Main, Providence, R. I.
Krout & Fite Mfg. Co., Allegheny Ave. & Emerald Philadelphia, Pa.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pearce Co., R. T., Covington, Ky.
Shield Brand. See Mitchell-Rand Mfg. Co.
Sidebotham, Inc., John, 4317 Griscom, Philadelphia, Pa.
Smith Belting Co. (Germantown), Philadelphia, Pa.
Superfine. See Windsor Webbing Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Windsor Webbing Co., Pawtucket, R. I.
Worcester Braiding Co., 34 Southbridge, Worcester, Mass.

TAPE, Mica

Chicago Mica Co., 345 Campbell, Valparaiso, Ind.
Mica Insulator Co., 200 Varick, New York, N. Y.
Micalite. See Mitchell-Rand Mfg. Co.
Mica Mfg. Co., 135 Johnson, Brooklyn, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TAPE, Rubber and Friction

Ackerman. See Ackurate Rubber Co.
Ackurate Rubber Co., 25 Beaver St., New York, N. Y.
Adamson & Co., Joseph, Columbia and Germantown Aves., Philadelphia, Pa.
Adhere. See Westinghouse Elec. & Mfg. Co.
Alpha. See Johns-Manville, Inc.
Amazon. See Graybar Elec. Co.
Appleton Rubber Co., Franklin, Mass.
Black Diamond. See Dunton Co., M. W.
Boston Woven Hose & Rubber Co., Boston, Mass.
Brooklyn. See Johns-Manville, Inc.
Bull-Dog. See Boston Woven Hose & Rubber Co.
Candee. See Ackurate Rubber Co.
Canfield Rubber Co., Bridgeport, Conn.
Canton. See Plymouth Rubber Co.
Clifton. See Clifton Mfg. Co.
Clifton Mfg. Co., 65 Brookside Ave., Boston 30, Mass.
Competition. See New York Insulated Wire Co.
Double-Wear. See Dryden Rubber Co.
Consumers Rubber Co., 1302 Ontario, N., Cleveland, O.
Coruco. See Consumers Rubber Co.
Criterion. See Consumers Rubber Co.
Dryden Rubber Co., 1014 S. Kildare Ave., Chicago, Ill.
Dun-See, A. & B. See Okonite Co.
Dunton Co., M. W., 670 Eddy St., Providence, R. I.
Dutch-Brand. See Van Cleef Bros.
Elkhart Rubber Wks., Elkhart, Ind.
Firestone Tire & Rubber Co., Akron, O.
General Electric Co. Merchandise Dept., Bridgeport, Conn.
Graybar Elec. Co., Graybar Bldg., New York, N. Y.
Grimshaw. See New York Insulated Wire Co.
Grindite. See Canfield Rubber Co.
Holfast Rubber Co., Atlanta, Ga.
Holditite. See United States Rubber Co.
Hydro-Proof. See Elkhart Rubber Wks.

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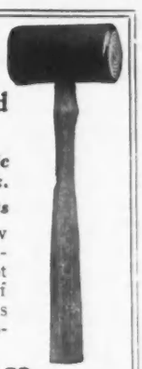

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Impervo. See Canfield Rubber Co.
Ireo. See Imperial Rubber Co.
Johnson & Johnson, New Brunswick, N. J.
Johns-Manville Corp., New York, N. Y.
Jomanco. See Johns-Manville, Inc.
Jonflex. See Johnson & Johnson.
Kerite Ins. Wire & Cable Co., 30 Church, New York, N. Y.
Manson. See Okonite Co.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
New York Insulated Wire Co., 114 Liberty, New York, N. Y.
Noxall. See Consumers Rubber Co.
Okonite Co., Passaic, N. J.
O. K. See Appleton Rubber Co.
P. & B. See Ruberoid Co.
Paratex. See Appleton Rubber Co.
Paruco. See Passaic Rubber Co.
Passaic Rubber Co., Clifton, N. J.
Plymouth Rubber Co., 1400 Revere, Canton, Mass.
Red-X. St. Louis Rubber Cement Co.
Relio. See United States Rubber Co.
Ruberoid Co., 95 Madison Ave., New York, N. Y.
Sitco. See Superior Insulation Tape Co.
Slipknot. See Plymouth Rubber Co.
Star. See Sullivan & Sons Mfg. Co., J.
Sticka. See Graybar Elec. Co.
Stixwell. See Clifton Mfg. Co.
Sullivan & Sons Mfg. Co. J., 2224 N. 9th, Philadelphia, Pa.
Superior Insulating Tape Co., 3044 Lambain Ave., St. Louis.
2-Plex. See Holfast Rubber Co.
U. S. See United States Rubber Co.
United States Rubber Co., 1790 Broadway, New York, N. Y.
Useo. See United States Rubber Co.
Van Cleef Bros., 7722 Woodlawn Ave., Chicago.
Victor. See Graybar Elec. Co.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

TAPE, Varnished Fabric

Acme Wire Co., New Haven, Conn.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Irvington Varnish & Insulator Co., Irvington, N. J.
Irv-O-Flatseme. See Irvington Varnish & Insulator Co.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mitchell-Rand Mfg. Co. 19 Vesey, New York N. Y.
New Jersey Wood Finishing Co., Amboy Ave., Woodbridge, N. J.
Radiotape. See Respro, Inc.
Respro, Inc., Wellington Ave. (Auburn), Providence, R. I.
Shield Brand. See Mitchell-Rand Mfg. Co.
Sico. See Standard Insulator Co.
Standard Insulation Co., East Rutherford, N. J.
Voltape. See Respro, Inc.

TAPING MACHINES, Coil

Chapman Electric Works, P. E., 1820 Chouteau Ave., St Louis, Mo.
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. and Chestnut St., Brooklyn, N. Y.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Griswold Machine Co., George, New Haven, Conn.
Ridlon Company, Frank, Boston, Mass.
Segur. See Electric Service Supplies Co.
Seifert, E. R., 315 E. Washington, Syracuse, N. Y. (Automatic.)

TAPING MACHINES, Wire

American Insulating Machinery Co., 519 Huntington Ave. Philadelphia, Pa.
Wire Machinery Corp. of Am., New Haven, Conn.

TAPS. See Stocks, Dies and Reamers.
TENSION DEVICES, Coil Wire. See Racks, Wire Reel

TENSION MACHINES, Band Wire

Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Peerless. See Electric Service Supplies Co.

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Burton-Rogers Co., Boston, Mass.
Clark Metal Products, 490 Hancock Ave., Bridgeport.
Dixie Supply Co., 91 7th Ave., New York.
Double Grip. See Pons, Eugene
Eagle Elec. Mfg. Co., 59 Hall, Brooklyn, N. Y.
Electron. See Bassett Metal Goods Co.
Fahnestock Elec. Co., East Ave. and 8th, Long Island City, N. Y.
Grammes & Sons, Inc., L. F., Allentown, Pa.
Ideal Clamp Mfg. Co., 198 Bradford, Brooklyn, N. Y.
K. E. M. See Kulier Elec. Mfg. Co.
Kulier Elec. Mfg. Co., 575 Pierce Ave., Long Island City
Morse Co., Frank W., 291 Congress, Boston, Mass.
Nu-Way Snap. See Hatheway Mfg. Co.
Ohio Parts Co., 3301 Colerain Ave., Cincinnati, O.
Orum, S. R. M., 503 N. 11th, Philadelphia, Pa.
Patton-MacGuyer Co., Providence, R. I.
Pons, Eugene, 927 Campbell Ave., Schenectady, N. Y.
Peterson Co., 7 Beverly, Providence, R. I.
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Tinkerbox. See Weber Elec. Wks.
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Hobart Bros. Co., Troy, Ohio.
Marshall Elec. Co., Elkhart, Ind.
Miho Company, 717 Sycamore, Cincinnati, Ohio.
North East Appliance Corp., 379 Lyell Ave., Rochester, N. Y.
Pence & Son, H. O., San Luis Obispo, Cal.
Weidenhoff, Joseph, 4352 Roosevelt Road, Chicago, Ill.

TESTING INSTRUMENTS. See Instruments.

TESTERS, Coil

(Includes Armature Growlers, trouble shooters, and other portable testing devices). See also Instruments
Ace. See Weidenhoff, Joseph.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Allen Electric & Equipment Co., Kalamazoo, Michigan.
Ankenbrandt, J. J., 2140 Wakeman, Toledo, Ohio.
Armeter. See Chapman Electric Works, P. E.
Burton-Rogers Co., 857 Boyleston, Boston, Mass.
Century Electrical Co., 100 Randall Ave., Syracuse, N. Y.
Chapman Elec'l Works, P. E., 1820 Chouteau Ave., St Louis, Mo
Cleveland Steel Products Corp., 7306 Madison Ave., Cleveland, O.
Colpin Corp., 6110 S. Main, Los Angeles, Cal.
Columbia. See Weidenhoff, Joseph.
Comparometer Co., New Ulm, Minn.
Cowie Electric Co., E. S., 1823 Wyandotte, Kansas City, Mo.
Economy. See Weidenhoff, Joseph.
Electric Controller & Mfg. Co., 2700 E. 79th, Cleveland.
Electrotest. See Comparometer Company.
Ev-Ri-Test. See Weidenhoff, Joseph.
Ga-Jit. See General Instrument Corp.
General Instrument Corp., 225 Varick, New York, N. Y.
Herald Elec. Co., 29 East End Ave., New York, N. Y.
Hobart Bros. Co., Troy, Ohio.
Ideal. See Ankenbrandt, J. J.
Indiana Mfg. & Electric Co., Marion, Indiana.
Leich Electric Co., Genoa, Ill.
Lundin Electric Machine Co., 10 Thacher, Boston, Mass.
Mallory Electric Co., Factories Bldg., Toledo, Ohio.
Marshall Elec. Co., Elkhart, Ind.
Miho Company, 717 Sycamore, Cincinnati, Ohio.
North East Appliance Corp., 379 Lyell Ave., Rochester, N. Y.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Paneltest. See Allen Elec. & Equip. Co.
Portometer. See Allen Elec. & Equip. Co.
Portostat. See Allen Elec. & Equip. Co.
Presto. See Metal Specialties Mfg. Co.
Rex Batrowtat. See Bartlett Products Co
Rubicon Co., 29 N. Sixth, Philadelphia, Pa.
Scout. See Leich Electric Company.
States Co., 19 New Park Ave., Hartford, Conn. (Transformer Test Table)
Test-All. See Colpin Corp.
Test-O-Meter. See Weidenhoff, Joseph.
Test-Rite. See Colpin Corp.
Victory. See Weidenhoff, Joseph.
Weidenhoff, Joseph, 4352 Roosevelt Road, Chicago, Ill.

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Baker & Co., Inc., 54 Austin, Newark, N. J.
Elec'l Testing Laboratories, 80th St. and East End Ave., New York, N. Y.
National Elec'l Inst. Co., 162 Sidney, Cambridge, Mass.
New York Testing Laboratories, 80 Washington, New York.
Rubicon Co., 29 N. Sixth, Philadelphia, Pa.

THERMO JUNCTIONS. See Instruments, Laboratory Standard.

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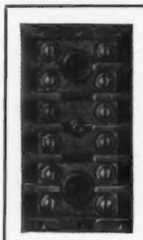
Baker & Co., Inc., 54 Austin, Newark, N. J.
Chace Valve Co., W. M., 1608 Beard Ave., Detroit, Mich.
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J.
Cook Plate Co., Edw. N., 70 Ship, Providence, R. I.
General Plate Co., Attleboro, Mass.
Improved Seamless Wire Co., 775 Eddy, Providence, R. I.
Interstate Products Corp., 503 Mulberry, Newark, N. J.
National-Harris Wire Co., Newark, N. J.
Venbur. See Coffin Mfg. Co., B. F.
Wilco. See H. A. Wilson Co.
Wilson Co., H. A., Newark, N. J.

THERMOSTATS

Airswitch. See Time-O-Stat Controls Co.
American Thermostat Co., 226 Jelliff Ave., Newark, N. J.
Automatic Appliance Co., Jackson, Mich.
Bak-Rite. See Electric Appliance Mfg. Co.
Bishop & Babcock Sales Co., 4901 Hamilton Ave., N. E., Cleveland, O.
Boston Machine Wks. Co., 7 Willow, Lynn, Mass.
Brown. See Electric Automatic Appliance Co.
Brown Instrument Co., Wayne & Windrim, Philadelphia, Pa.
Burke Controller Co., 369 Lexington Ave., New York, N. Y.
Cobb Elec. Appliance Co., 100 Massachusetts Ave., Boston,
Coffin Mfg. Co., B. F., 30 Court, Newark, N. J.
Diamond H. See Hart Mfg. Co.
Dunco. See Struthers Dunn, Inc.
Electric Automatic Appliance Co., 1748 Arapahoe, Denver, Colo.
Electric Heat Control Co., 5902 Carnegie Ave., Cleveland, O.
Electric Maid. See Hankscraft Co.
Freas Thermo-Electric Co., 1206 S. Grove, Irvington, N. J.
Globe Mfg. Co., Battle Creek, Mich.
Hankscraft Co., 615 E. Washington, Madison, Wis.
Hart Mfg. Co., Hartford, Conn.
Hi-Lo. See Boston Machine Wks. Co.
Hynes & Cox Elec. Corp., 406 N. Pearl, Albany, N. Y.
Interstate Products Corp., 503 Mulberry, Newark, N. J.
King. See Electric Heat Control Co.
Klixon. See Westinghouse Electric & Mfg. Co.
Marvel. See American Thermostat Co.
Mercoid Corp., 4201 Belmont Ave., Chicago, Ill.
Moeller, A. E., 261 Sumpter, Brooklyn, N. Y.
National Steel Construction Co., 425 Fountenac, Seattle, Wash.
Pyratherm. See Mercoid Corp.
Safety Regulator Co., 529 S. Mathews, Los Angeles, Cal.
Savutime Devices, Inc., 88 Manhattan, Rochester, N. Y.
Stat-Amatic Instrument & Appliance Co., Hartford, Conn.
Struthers Dunn, Inc., 138 N. Juniper, Philadelphia, Pa
Tagliabue Mfg. Co., C. J., 18 33rd, Brooklyn, N. Y.
Teeple Co., L. R., 540 E. 9th, Portland, Ore.
Thermoelectric. See Bishop & Babcock Sales Co.
Time-O-Stat Controls Co., Elkhart, Ind.
Trent Co., Harold E., 439 N. 12th, Philadelphia, Pa.
Visaflame. See Mercoid Corp.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilcolator Co., 17 Nevada, Newark, N. J.

TIGHTENERS, Commutator

Elmes Engineering Works, Chas. F., 230 N. Morgan Chicago, Ill.



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TINE SWITCHES. See Switches, Time.

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United States Foil Co., 30th & Grand Sts., Louisville, Ky.
TINNING TANKS, WIRE. See Wire Manufacturing Machines.
TINSEL. See Tinsel, Cord & Thread.

TINSEL, Cord and Thread

Belden Mfg. Co., 4633 W. Van Buren, Chicago, Ill.
Diamond Braiding Mills, Chicago Heights, Chicago, Ill
Empire Notion Co., 335 W. 35th, New York, N. Y.
Frank & Co., M. J., 15 W. 30th St., New York, N. Y.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Hy-Sil Mfg. Co., Revere, Mass.
Kilo Co., 2 E. 23rd, New York, N. Y.
Koelle, Frederick C., Real Estate Trust Bldg., Philadelphia.
Lees Mfg. Co., 320 Broadway, New York, N. Y.
Montgomery Co., J. R., Windsor Locks, Conn.
Rockbestos Products Corp., 389 Nicoll, New Haven, Conn.
Springfield Wire & Tinsel Co., Springfield, Mass.

TIPS, Cord

Duro. See McEvoy, C. H.
McEvoy, C. H., 430 Broadway, Lowell, Mass.
National Acme Mfg. Co., 7500 Stanton Ave., Cleveland, O.
Norden & Co., S. 180 S. Water, Providence, R. I.
Rome Wire Co., Div. of General Cable Corp., Rome, N. Y.
Waterbury Brass Goods Corp., Waterbury, Conn.

TOOLS, Commutator Slotting. See Slotting Machines & Tools, Commutator.

TOOLS, Coil Tamping

Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.

TOOLS, Commutator Truing

Acme. See Green Equipment Corp.
Allen Elec. & Equipment Co., Kalamazoo, Mich.
Binghamton Flexible Shaft Co., Binghamton, N. Y.
Central Mfg. Co., Fairfield, Ia.
Green Equipment Corp., 260 Monadnock Block, Chicago, Ill.
Ideal Commutator Dresser Co., 1039 Park Ave., Sycamore, Ill.
Imperial. See Martindale Elec. Co.
Jordan Bros., 74 Beekman, New York, N. Y.
Martindale Elec. Co., 1262 W. Fourth, Cleveland, Ohio.

TOOLS, Storage Battery

Battery Tools Co., 29 Willow, Montclair, N. J.
Bobbett Elec. Mfg. Co., 4307 Cottage Grove Ave., Chicago, Ill. (Knife Heaters.)
Canedy-Otto Mfg. Co., 1816 McGee, Chicago Heights, Ill. (Floor Vises.)
Cleveland Steel Products Corp., 7306 Madison Ave., Cleveland, O. (Steamer and Still, Filler, Separator Cutter, Clips, Carrier, Post Cutter, Terminal and Cell Puller.)
General Elec. Co., Schenectady (Lead Burning Outfits.)
Heet-A-Knife. See Bobbett Elec. Mfg. Co.
Ohio Parts Co., 3301 Colerain Ave., Cincinnati. (Terminals.)
Op-Al Elec. & Mfg. Co., 1057 E. 30th St., Indianapolis, Ind. (Knife Heaters.)
Orum, S. R. M., 503 N. 11th, Philadelphia, Pa. (Pillar Post Sleeves, Tongs, Reamers, Strap Punches, Terminal Pullers, Steamers, Racks or Stands, Terminal Post Shapers, Battery Analyzer, Post Sealing Machine, Plate Burning Press, Press and Stands.)
Pyratip. See General Elec. Co.
Thompson Mfg. Co., Meadville, Pa. (Reamers, Terminal Post Pullers, Pressing Tongs.)

TORCHES AND FURNACES

Acetylene, Alcohol, Gasoline, Kerosene.
Always Reliable. See Otto Bernz Co.
Bernz Co., Otto, Newark, N. J.
Clayton & Lambert Mfg. Co., 6232 Beaubien, Detroit, Mich.
Dreadnaught. See Wall Mfg. Supply Co.
Klein & Sons, Mathias, Chicago, Ill.
Lasher-Weeber Co., 261 Franklin, Boston, Mass.
McGill Mfg. Co., Valparaiso, Ind.
Staysalite. See Klein & Sons, Mathias.
TORPEDO Cord. See Twine.
TORSION BALANCES. See Instruments, Laboratory Standard

TRANSFORMERS

Radio. See Radio Circuit Components.
Gas Tube Sign. See Transformers, Oil Burner.
Oil Burner Ignition. See Transformers, Low & Inter-

TRANSFORMERS, Low and Intermediate Voltage

For Oil Burners, Gas Tube Signs, and other special purposes.
American Bosch Magneto Corp., Springfield, Mass.
American Transformer Co., 178 Emmet, Newark, N. J.
Campbell Elec. Mfg. Co., 15 Stewart, Lynn, Mass.
Concourse Electric Co., 294 E. 137th, New York, N. Y.
Dongan Elec. Mfg. Co., 2985 Franklin, Detroit, Mich.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Forjos. See Motorless D. C. Neon Sign Co.
General Electric Co. (Merchandise Dept.), Bridgeport, Conn
Jefferson Electric Co., 1500 S. Laflin, Chicago, Ill.
K-W Ignition Corp., 2811 Chester Ave., Cleveland, Ohio
Motorless D. C. Neon Sign Co., 100 E. 123rd, New York. (Neon.)
Palmers Corp., Chas, 786 Broad, Newark, N. J.
Power Transformer Co., 145 W. 22nd, New York, N. Y.
Sorgel Electric Co., W. Water, Milwaukee, Wis.
Standard Transformer Co., Dana Ave., Warren, O
Uptigraff Mfg. Co., R. E., First National Bank Bldg., Pittsburgh, Pa.

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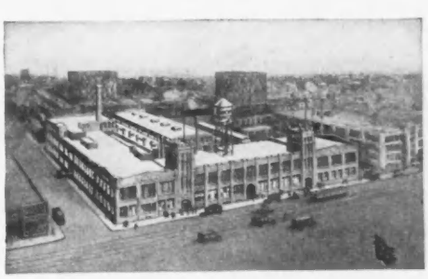

TRANSFORMERS, Low and Intermediate Voltage—Continued
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Webster Electric Co., Racine, Wis.
TRANSMISSION DRIVES. See Chain, Transmission.

TRANSMITTERS, Power

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Electric Service Supplies Co., 17th & Cambria Sts. Philadelphia, Pa.
Segur. See Electric Service Supplies Co.
TROUBLE FINDERS. See Instruments, Portable and Switchboard; also Testers, Coil.
TRUCKS, Armature. See Lifts, Armature.

TRUCKS, Factory Steel

Angle Steel Stool Co., Plainwell, Mich.
TRUING Devices, Commutator. See Tools, Commutator.
TUBE (Tubes) (Tubing) Adapters. See Radio Receiver Parts.
Aluminum. See Aluminum.
Brass. See Tubing, Brass.
Condenser. See Tubing, Brass and Copper.
Copper. See Tubing, Brass.
Cutters. See Stocks, Dies, etc.
Fibre. See Fibre.
Fibre Candle. See Candles.
Mica. See Mica.
Nickel. See Tubing, Brass & Copper.
Paper. See Tubes, Paper.
Platinum. See Platinum.
Porcelain. See Porcelain.
Pyrometer. See Cores, Resistance.
Refractory. See Cores, Resistance.
Radio. See Radio Vacuum Tubes.
Varnished Fabric. See Tubing, Varnished Fabric.

TUBES, Paper; Cores; Sleeves, Bushings

Cleveland Container Co., 10619 Beres Rd., Cleveland, O.
Climax Tube Co., Mystic, Conn.
Klimaxcore. See Climax Tube Co.
McCausland, J. E., 86 Valley, Providence, R. I.
Pairpoint Corp., New Bedford, Mass.
Paper Tube Co., 1718 N. Damen Ave., Chicago, Ill.
Remington Mfg. Co., 939 Barnum Ave., Bridgeport, Conn.
Standard Underground Cable Co., Div. of General Cable Corp., Perth Amboy, N. J.
Stone Paper Tube Co., Washington, D. C.
Textile Tube Co., Fall River, Mass. (Paper Sleeves.)

TUBING, Brass and Copper

American Brass Co., Waterbury, Conn.
Anaconda. See American Brass Co.
Baltimore Tube Co., 1301 Wicomico, Baltimore, Md.
Bridgeport Brass Co., Bridgeport, Conn.
Bull Dog. See National Elec. Products Corp.
Chase Brass & Copper Co., Waterbury, Conn.
Conklin Brass & Copper Co., T. E., 54 Lafayette, New York.
Cook, Dunbar Smith Co., 85 Sprague, Providence, R. I.
Dallas Brass & Copper Co., Div. of Revere Copper & Brass, Inc., 820 Orleans, Chicago, Ill.
French Mfg. Co., 128 Robbins, Waterbury, Conn.
Michigan Copper & Brass Co., Div. of Revere Copper & Brass, 5851 W. Jefferson Ave., Detroit, Mich.
Mueller Brass Co., Port Huron, Mich.
National Copper & Smelting Co., 1395 Coltman Rd., Cleveland, O.
National Elec. Products Corp., Pittsburgh, Pa.
National-Harris Wire Co., Newark, N. J.
Nelleum. See Mueller Brass Co.
Roberts Tube Works, 2500 Military Ave., Detroit, Mich.
Rome Brass & Copper Co., Rome, N. Y.
Rome Hollow Wire & Tube Co., Div. of Revere Copper & Brass, Inc., Rome, N. Y.
Rome Turney Radiator Co., Rome, N. Y.
Scovill Mfg. Co., Waterbury, Conn.
Standard Underground Cable Co. (Div. of General Cable Corp., Perth Amboy, N. J.
Summerill Tubing Co., Bridgeport, Pa. (also Nickel)
Torrington Mfg. Co., Torrington, Conn.
United Wire & Supply Co., 1497 Elmwood Ave., Providence
Wells Co., A. H., Watertown Ave., Waterbury, Conn.
Wolverine Tube Co., 1431 Central Ave., Detroit, Mich.

TUBING, Flexible Metallic

(Flexible Tubing.)
Almond Mfg. Co., T. R., Ashburnham, Mass.
American Metal Hose Co., Waterbury, Conn.
American Metal Moulding Co., Irvington, N. J.
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y.
Auto-Brassflex. See National Elec. Products Corp.
Auto-Steelflex. See National Elec. Products Corp.
Breeze Corp. Inc., 24 S. 6th Newark, N. J.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Flexo Spring Mfg. Inc., 34 South First, Brooklyn, N. Y.
National Elec. Products Corp., 1110 Fulton Bldg., Pittsburgh, Pa.
Riflex. See United Metal Hose Co.
Sleeper & Hartley, Inc., Worcester, Mass.
Time-O-Stat Controls Co., Elkhart, Ind.
Titeflex Metal Hose Co., Newark, N. J.
Triangle Conduit Co., Dry Harbor Rd. and Cooper Ave. Brooklyn, N. Y.
United Metal Hose Co., 724 Garrison Ave., New York, N. Y.
White Dental Mfg. Co. (Industrial Div.), S. S., 152 W. 42nd, New York, N. Y.

TUBING, Rubber

Rubber Tubing for Insulating Wire in Instruments and Telegraph Signal Lines.
Canfield Rubber Co., 703 Railroad Ave., Bridgeport, Conn.
Eisler Electric Corp., 756 S. 13th, Newark, N. J.
Faultless Rubber Co., Ashland, O.
Goodrich Rubber Co., B. F., Akron, O.
Rubber-Vac. See Eisler Electric Corp.
Tyler Rubber Co., Andover, Mass.
Vulcanized Rubber Co., 251 Fourth Ave., New York, N. Y.

TUBING, Varnished Fabric

Insulating Tubing—Spaghetti.
Acme Wire Co., New Haven, Conn.
Alpha Wire Corp., 520 Broadway, New York, N. Y.
Bentley-Harris Mfg. Co., Conshohocken, Pa.
Brand & Co., William, 200 Fourth Ave., New York, N. Y.
Empire. See Mica Insulator Co.
General Electric Co., Merchandise Dept., Bridgeport, Conn.
Goodrich Rubber Co., B. F., Akron, O.
Insulated Duct & Cable Co., Stokes, Trenton, N. J.
Faultless Corp. of America, 78 Cortlandt, New York, N. Y.
Irvington Varnish & Insulator Co., Irvington, N. J.
Lee Tire & Rubber Co., Conshohocken, Pa.
Mica Insulator Co., 200 Varick, New York, N. Y.
Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Pearce Co., R. T., Covington, Ky. (Insulated Waxed Cotton.)
Turbo. See Brand & Co.
Varflex Corp., Rome, N. Y.
TURNED-UP BOXES AND CABINETS. See Cabinets, Sheet Steel
TURNING TOOLS, COMMUTATOR. See Tools, Commutator Truing.

TWINE, Armature Winding; Torpedo Cord

Mitchell-Rand Mfg. Co., 19 Vesey, New York, N. Y.
Winne & Son, Frank W., 42 N. Front, Philadelphia, Pa.

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UNDERCUTTERS, Mica. See Slotting Machines & Tools, Commutator.
UNITS, Refrigerator Condenser. See Condenser Units, Refrigerator.

UNITS, Rods and Grids, Resistance

Acme Elec. Heating Co., Dept. R, 1217 Washington, Boston.
Allen-Bradley Co., 493 Clinton, Milwaukee, Wis.
Automatic Electric Heater Co., 1524 Race, Philadelphia, Pa
Bradleyunit. See Allen Bradley Co.
Buffalo Products Co., Broome & Lafayette Sts., New York
Burger, J. P., 1813 Columbus Rd. Cleveland O
Calrod. See Edison General Elec. Appliance Co., Inc
Chromalox. See Edwin L. Wiegand Co.
Clark Controller Co., 1146 E. 152nd, Cleveland, O.
Crown Coloring & Chemical Co., 33 W. 17th, New York.
Cutler-Hammer, Inc., 1258 St. Paul Ave., Milwaukee.
Dalton Elec. Heating Co., 287 Bridge St., Salem, Mass
Dalton-Marsh Co., 85 Holten, Danvers, Mass
Di-El-Ite. See Wirt Co.
Dixon Crucible Co., Jos., Monmouth, Jersey City, N. J.
Dur-ristor. See Cutler-Hammer, Inc.
Eagle Elec. Mfg. Co., 79 Hall, Brooklyn, N. Y.
Edgerest. See Industrial Controller Div.
Edgewound. See Monitor Controller Co.
Edison General Electric Appliance Co., Inc., 5600 W. Taylor, Chicago, Ill.
Edgewound. See Monitor Controller Co. & Clark Controller Co.
Elec. Controller & Mfg. Co., 2700 E. 79th, Cleveland, O
Elemite. See Louthan Mfg. Co.
Erie Resistor Corp., 644 W. Twelfth, Erie, Pa.
Fits-All. See Eagle Elec. Mfg. Co.
Fitz-All. See Rodale Mfg. Co.
F & M. See Hiram Marks Elec. Co.
General Electric Co., Schenectady, N. Y.
Globar Corp., Niagara Falls, N. Y.
Glo-Well. See Eagle Elec. Mfg. Co.
Gold Seal Elecl. Co. of Ohio, Inc., 250 Park Ave., New York, N. Y.
Hance-Parker Mfg. Co., 397 West Main, Meriden, Conn.
Hankscraft Co., 615 E. Washington, Madison, Wis (Oven Heater Unit.)
Hardwick, Hindle, Inc., 216 Emmett, Newark, N. J.
Hexwound. See Monitor Controller Co
Industrial Controller Div. of Square D Co., S. Pierce & Hanover Sts., Milwaukee, Wis.
Industrial Heater Co., 300 Canal, New York, N. Y.
Kriscker's Mfg. Co., 255 Calyer, Brooklyn.
Lautz Mfg. Co., 245 N. J. R. R. Ave., Newark, N. J.
Louthan Mfg. Co., East Liverpool, O.
Marks, Elec. Co., Hiram, 304 Woodward Ave., Detroit, Mich
Micamold Radio Corp., 1087 Flushing Ave., Brooklyn, N. Y.
Monitor Edgewound. See Monitor Controller Co. & Clark Controller Co.
Monitor Controller Co., 51 S. Gay, Baltimore, Md.
Nelco. See Nelson Electric Co.
Nelson Electric Co., Plant City, Fla.
Northern Electric Co., 2833 N. Western Ave., Chicago Ill
Ohmite Mfg. Co., 633 N. Albany Ave., Chicago, Ill.
Ohm-Spun. See States Co.
Op-Al Elec. & Mfg. Co., 1057 W. 30th, Indianapolis, Ind.
Parker & Co., J. C., 407 Bulletin Bldg., Philadelphia, Pa
Poloron Elec. Mfg. Corp., 26 Waverly Pl., New York, N. Y.
Presto Products Co., 520 Broadway, New York, N. Y.
Prometheus Elec. Corp., 358 W. 13th, New York, N. Y.
Pyrox. See Westinghouse Elec. & Mfg. Co.
Reben Elec. Mfg. Co., 2024 Gravesend Ave., Brooklyn, N. Y
Remco. See Reben Elec. Mfg. Co.
Repairall. See Waage Elec. Co.
Replaceall. See Waage Elec. Co.
Ribohm. See Ward Leonard Elec. Co.
Rodale Mfg. Co., 200 Hudson, New York, N. Y.
Rubicon Co., 29 N. Sixth, Philadelphia, Pa.
Sepco. See Automatic Electric Heater Co.
Smith & Co., T. C., 3915 Powelton Ave., Philadelphia, Pa.
Smoothwound. See Monitor Controller Co.
Snoco. See Snow & Co.
Snow & Co., E. W., Rochester, N. Y.
Stupakoff Laboratories, 6627 Hamilton Ave., Pittsburgh, Pa
Super. See Northern Elec Co
Superior Resistor Corp., 334 Badger Ave., Newark, N. J. (Radio)
United Metal Art Mfg. Co., 293 Wyckoff Ave., Brooklyn, N.Y
Vitrohm. See Ward Leonard Elec. Co.
Waage Elec. Co., 5100 W. Ravenswood Ave., Chicago.
Ward Leonard Elec. Co., 31 South, Mt. Vernon, N. Y.
Warren Elec. Appliance Co., Warren, Pa.
Watlow Elec. Mfg. Co., 1320 N. 23rd, St. Louis, Mo.
Westinghouse Elec. & Mfg. Co., Mansfield, O.
White Dental Mfg. Co., S. S., 152 W. 42nd, New York, N. Y. (Radio.)
Wiegand Co., Edwin L., 7530 Thomas Blvd., Pittsburgh, Pa
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Electric Steam Radiator Co., 8th Ave & Virginia, Seattle, Wash.
Electric & Valve Mfg. Co., 64 Murray, New York, N. Y.
Gas-Gard Co., 305 Main St., E., Rochester, N. Y. (Gas.)
General Electric Co., Schenectady, N. Y.
Golden-Anderson Valve Specialty Co., 1385 Fulton Bldg., Pittsburgh, Pa.
Lunkenheimer Co., Cincinnati, O.
Minneapolis-Honeywell Regulator Co., Fourth Ave. & 28th, Minneapolis, Minn.
Michigan Metal Products Co., Battle Creek, Mich.
Nacco Mfg. Co., 1483 Clara Ave., St. Louis, Mo.
Northside Elec. Co., 4227 Spring Grove Ave., Cincinnati O
Nu-Way Water Heater Control, Inc., 368 Erie Bldg., Cleveland, O.
Preferred Utilities Mfg. Corp., 33 W. 60th, New York, N.Y.
Savutime Devices, Inc., 83 Manhattan, Rochester, N. Y.
St. Louis Motor Valve Co., St. Louis, Mo.
Sentinel. See Electric Steam Radiator Co.
Tagliabue Mfg. Co., C. J., 18-83rd St., Brooklyn, N. Y
Teeple Co., L. B., 540 E. Ninth, Portland, Ore. (Gas.)
Time-O-Stat Controls Co., Elkhart, Ind.
Victor. See Lunkenheimer Co.
Zeco. See Zisch Engineering Corp.
Zisch Engineering Corp., 39 Avenue L, Newark, N. J. (Gas.)
VARNISH. See Paint, Varnish, Lacquer.
VARNISHED TAPE. See Tape, Varnished Fabric.
VARNISHED TUBING. See Tubing, Varnished Fabric.
VOLT BOXES. See Instruments, Laboratory Standard.
VOLTMETERS. See Instruments.
VULCANITE. See Rubber, Hard.

VULCANIZERS, WIRE INSULATION

American Insulating Machinery Co., 519 Huntington Ave. Philadelphia, Pa.
Biggs Boiler Works Co., Akron, Ohio.
WASHERS, FIBRE. See Fibre.

WASHERS, Lock

Washers, Non-Metallic. See also Gaskets, Fibre.
American Nut & Bolt Fastener Co., Pittsburgh, Pa.
Hobbs Mfg. Co., Worcester, Mass.
Kantlink. See National Lock Washer Co., Positive Lock Washer Co., Mansfield Lock Washer Co., Reliance Mfg. Co. & American Nut & Bolt Fastener Co.
Keystone. See Positive Lock Washer Co.
Mansfield Lock Washer Co., Mansfield O.
Massachusetts Machine Shop, Inc. Boston, Mass.
National Lock Washer Co., 40 Hermon, Newark, N. J.
Positive Lock Washer Co., Ave. A & Miller, Newark, N. J.
Reliance Mfg. Co., Massillon, O.
Shakeproof Lock Washer Co., 2533 N. Keeler Ave., Chicago.
St. Louis Malleable Casting Co., 7701 N. Conduit Ave., St. Louis, Mo.

WASHERS, Metallic

Bridgeport Brass Co., 774 E. Main, Bridgeport, Conn.
Chase Brass & Copper Co., Waterbury, Conn.
Hubbard Spring Co., M. D., Pontiac, Mich.
New England Screw Co., Dept. A., 44 Farnsworth, Boston.
Quadrigs Mfg. Co., 213 W. Grand Ave., Chicago, Ill.
Russell Mfg. Co., John M., Naugatuck, Conn.
United Screw & Bolt Corp., 2713 Cullerton, Chicago, Ill
Wrought Washer Mfg. Co., 46 S. Bay, Milwaukee, Wis.
WATTMETERS. See Instruments.

WASHERS, Non-metallic

See also Gaskets, Fibre.
Michigan Leather Washer Co., 548 E. Fort, Detroit, Mich.

WAX AND COMPOUNDS

Wax and Compound, Sealing and Filling	See W			
Junction Box, Potheads, Battery Tops, Bolt Head Holes.				
Wax and Compound	See S			
Saturating and Finishing, Braided Wire, Impregnating Fabric and Paper.				
Chatterton's Compound	See C			
Ackurate Rubber Co., 25 Beaver, New York, N. Y.		W		
Ajax. See Sherwin-Williams Co.				
Asphalt Products Co., 6531 S. State, Chicago		W	S	
Bishop Wire & Cable Corp., 420 E. 25th, New York, N. Y.				C
Biwax Corp., 208 S. La Salle, Chicago, Ill.		W	S	
Brand & Co., William, 268 Fourth Ave., New York, N. Y.		W		
Bulls-Eye. See Zinsser & Co.				
Cabielene. See Vacuum Oil Co.				
Candy & Co., 35th and Maplewood Ave., Chicago		W	S	
Cerowax. See Vacuum Oil Co.				
Clifton Mfg. Co., 65 Brookside Ave., Boston				C
Cochrane Chemical Co., 432 Danforth Ave., Jersey City, N. J.		W	S	
Dolph Co., John C., 168 Emmet, Newark, N. J.		W		
Di Electric Puttie. See Ackurate Rubber Co.				
Ever-Protect. See National Cable Compound Co.				
Flake White. See Williams Co., F. M.				
General Electric Co., Bridgeport, Conn.		W		
George Co., P. D., St. Louis		W		
Globe Chemical Co., Murray Road & Big 4 R. R. St. Bernard, Cincinnati, O.		W	S	
Goldo Brown. See Williams Co., F. M.				
Great Lakes Thread & Yarn Co., Div. of General Cable Corp., 5133 Wesson Ave., Detroit		W		
Hercules Powder Co., 975 Market, Wilmington, Del. (Wood Rosin)			S	
Hexsulate. See Tar Products Corp.				
Imco. See Great Lakes Thread & Yarn Co.				
India Red Seal. See Williams Co., F. M.				
Insulatine Co., 1 Broadway, New York		W		
Insulation. See Vacuum Oil Co.				
Knox & Morse Co., 80 Freeport, Boston, Mass.		W	S	
Leverite. See Mitchell-Rand Mfg. Co.				
Lime Seal. See Mitchell-Rand Mfg. Co.				
McGill Mfg. Co., Valparaiso, Ind.				C
Minerallac Elec. Co., 1045 Washington Blvd., Chicago, Ill.		W		
Mitchell-Rand Mfg. Co., 19 Vesey, New York		W	S	C
Mule-Hide. See Lehon Co.				
National Cable Compound Co., Mitchell, Ind.		W		
National Wax Co., 189 W. Madison, Chicago, Ill.		W	S	
Nu-Blac. See Star Porcelain Co.				
Par Flexo. See Williams Co., F. M.				
Rubberseal. See Mitchell-Rand Mfg. Co.				
Rub-Flexo. See Williams Co., F. M.				
Seldner & Enequist, Inc., 86 Hausman, Brooklyn, N. Y.		W		
Sherwin-Williams Co., Cleveland, O.		W		C
Standard Varnish Wks., 433 4th Av., New York		W		
Standard Wax & Import Co., 110 E. 42nd, New York, N. Y.		W	S	
Star Porcelain Co., Muirhead Ave., Trenton, N. J.		W		C
Tacrite. See Seldner & Enequist, Inc				
Tar Products Corp., Indiana Trust Bldg., Providence, R. I.			S	

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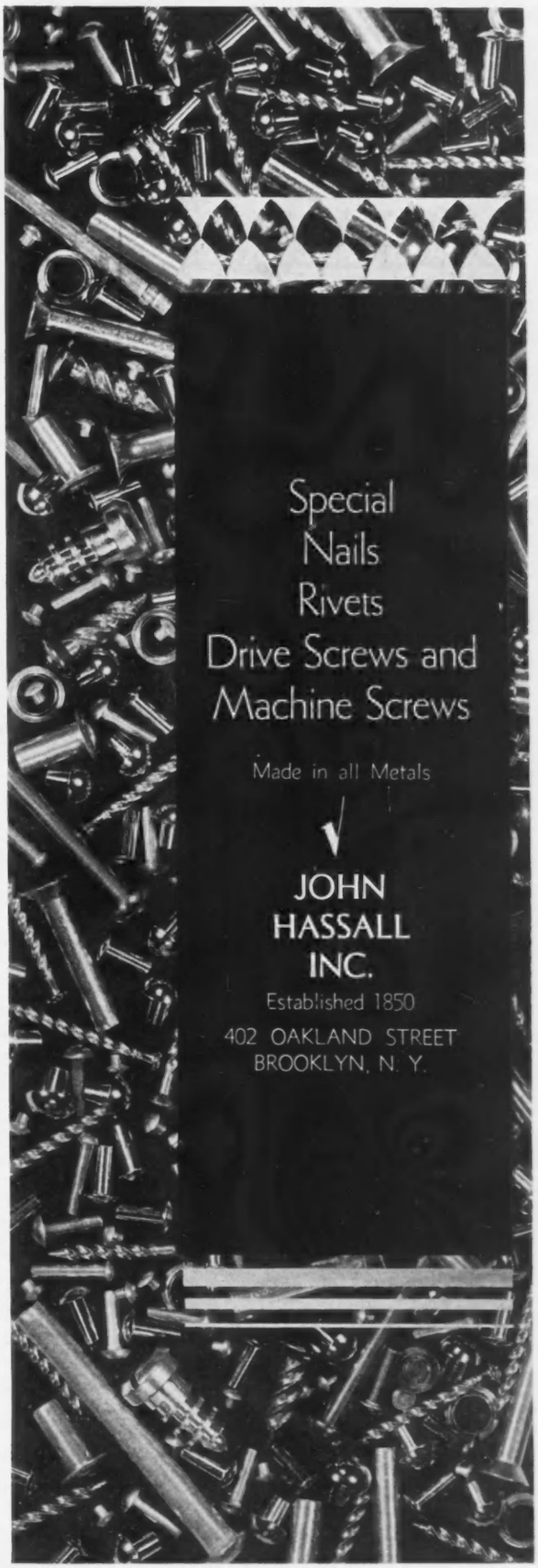

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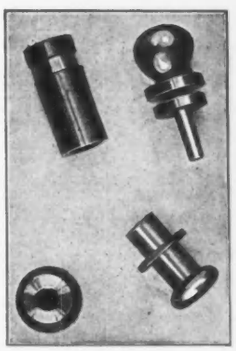

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Bridgeport, Conn.

WAX & COMPOUNDS—Continued
Trester & Co., E. T., 576 Johnson Ave., Brooklyn, N. Y. ..... W S ..
Vacuum Oil Co., 61 Broadway, New York, N. Y. W .. ..
Warner-Quinlan Co., 3 Park Ave., New York, N. Y. C
Waverly Oil Wks., 54th and A. V. R. R., Pittsburgh, Pa. ..... S ..
Williams Co., F. M., 1288 Prospect Ave., Brooklyn, N. Y.
Zinsser & Co., 48 Vesey, New York, N. Y..... W .. ..
WEDGE DRIVERS. See Tools, Commutator.
WELDS, Lamp Lead-in. See Filaments, Incandescent

WELDING AND CUTTING OUTFITS

Electric Arc, Spot, Butt and Seam Metal Welders and Metal Cutting Outfits.
Acme Elec. Welder Co., 1850 W. Fulton, Chicago, Ill.
A. E. F. See American Electric Fusion Corp.
Agnew Electric Welder Co., Milford, Mich.
Allan Mfg. & Welding Co., Inc., 736 Washington, Buffalo
Almano. See Allan Mfg. & Welding Co., Inc.
Alternarc. See Electric Arc Cutting & Welding Co.
American Elec. Fusion Corp., 2610 Diversey Ave., Chicago
Burke Electric Co., Erie, Pa.
Economy Electric Products Co., 2400 Woodland Ave., Cleveland, O.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Electric Arc Cutting & Welding Co., 156 Jelliff Ave., Newark, N. J.
Electric Welding, 744 Court, Brooklyn, N. Y.
Electric Welding Machine Co., 1530 Larned, E., Detroit.
Farwest Electric Welder Co., 1107 Northlake Ave., Seattle.
Federal Machine & Welder Co., Dana Ave., Warren, O.
Fleet-Weld. See Lincoln Elec. Co.
Flex-A-Weld. See Trumbull Elec. Mfg. Co.
General Electric Co., Schenectady, N. Y.
General Engrg. & Supply Co., 160 5th Ave., New York, N. Y.
Hansen. See Northwestern Mfg. Co.
Hobart Mfg. Co., Simpson & Penn Sts., Troy, Ohio
Holup Corp., C. H., 3333 W. 48th Place, Chicago, Ill.
Lincoln Electric Co., Coit Rd. and Kirby Ave., Cleveland.
Lundy Co., E. A., Fulton Bldg., Pittsburgh, Pa.
Macleod Co., 2232 Bogen, Cincinnati, O.
McAdams Co., J. C., New Britain, Conn.
Nigg Engineering Corp., Second St. & Covina Blvd., Covina, Cal.
Northwestern Mfg. Co., 480 Clinton, Milwaukee, Wis.
Owen Elec. Mfg. Co., Fayetteville, N. C.
Plastic Arc. See Wilson Welder & Metal Co.
Pyrotip. See General Elec. Co.
Quasi-Arc, Inc., 11 W. 42nd St., New York, N. Y.
Rhason Mfg. Co., 124 45th, Union City, N. J.
Ryerson & Son, Jos. T., 2558 W. 16th, Chicago, Ill.
Sellars Arc Welder Co., 1200 Fourth Ave., Seattle, Wash.
Seneca Electric Welder Corp., 5857 Woodward, Detroit, Mich
Siemund Wentzel Electric Welding Co., 79 Hancock, Long Island City, N. Y.
Swift Elec. Welder Co., 2567 W. Grand Blvd., Detroit.
Taylor-Winfield Corp., Mahoning Ave., Warren, O.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Toledo. See Thomson-Gibb Elec. Welding Co.
Trumbull Elec. Mfg. Co., Plainville, Conn.
Una Welding & Bonding Co., 1615 Collamer Ave., Cleveland, O.
U. S. L. Battery Corp., Niagara Falls, N. Y.
Weldite. See Fusion Welding Corp.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wilson Welder & Metal Co., Hoboken factory, Terminal Bldg., Hoboken, N. J.
Zeus. See Thomson-Gibb Elec. Welding Co.
WHEATSTONE BRIDGES. See Instruments, Laboratory Standard.

WICKS, Lubricating

Brawley Felt Co., Inc., T. R., 279 20th, Brooklyn, N. Y.

WINDERS

Armature & Field Coil. See Winding Machines, Armature & Field Coil.
Coil. See Winding Machines, Armature & Field Coil.
Electromagnet. See Winding Machines, Induction Coil.
Filament. See Machines, Lamp Making.
Induction Coil. See Winding Machines, Induction Coil.
Loop. See Winding Machines, Armature & Field Coil.

WINDING MACHINES, Armature and Field Coil

Acme Elec. & Mfg. Co., 1447 Hamilton Ave., Cleveland, O.
Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Browning. See Mutual Foundry & Machine Co.
Chapman Electric Works, P. E., 1820 Chouteau Ave., St. Louis, Mo.
(Continued)
Columbia Machine Works & Malleable Iron Co., Atlantic Ave. & Chestnut St., Brooklyn, N. Y.
Comstock Mfg. Co., Wilkes-Barre, Pa.
Conran, Frederick M., 107 Colden, Newark, N. J.
Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Handy. See Armature Coil Equipment Co., 2415 Forestdale Ave., Cleveland, Ohio.
Herald Electric Co., 29 East End Ave., New York, N. Y.
Hunsdorf, Wm., 2056 E. Fourth, Cleveland, O.
Liberty Starter Co., 241 Vinewood Ave., Detroit, Mich.
Meissner Mfg. Co., 522 S. Clinton, Chicago, Ill.
Mutual Foundry & Machine Co., Atlanta, Ga.
Onan, David W., 43 Royalstone Ave., Minneapolis, Minn.
Peerless. See Electric Service Supplies Co.
Ridlon Co., Frank, 253 A St., Boston, Mass.
Segur. See Electric Service Supplies Co.
Seifert, E. R., 315 E. Washington, Syracuse, N. Y.
Superior. See Armature Coil Equipment Co.

WINDING MACHINES, Induction Coil

Acme Elec. & Mfg. Co., 1447 Hamilton Ave., Cleveland, O.
Belden Mfg. Co., 4633 W. Van Buren, Chicago, Ill.
Conran, Frederick M., 107 Colden, Newark, N. J.
Kerwin Tool & Machine Co., 42 Walnut, Newark, N. J.

Lessons. See Universal Winding Co.
Lipe, W. C., 206 S. Geddes, Syracuse, N. Y.
Norris Register Co., 29th & Broadway, Council Bluffs, Iowa
Radio Production Machinery Co., 315 Centre, New York.
Seifert, E. R., 315 E. Washington, Syracuse, N. Y.
Universal Winding Co., Boston, Mass.
Viking Tool & Machine Co., 747 65th, Brooklyn, N. Y.
Weehawken Engineering & Mfg. Co., 525 Gregory Ave., Weehawken, N. J.
WINDINGS. See Coils, Finished.

WINDOW SHADES, Factory

Athey Co., 6143 West 65th St., Chicago, Ill.
WIRE (Cable) (Cord), Aluminum. See Aluminum.
Copper Clad. See Wire, Copper Clad.
Forms. See Forms, Wire.
Frames. See Forms, Wire.
Fuse. See Fuses and Fuse Wire.
Lamp & Tube Filament. See Filaments, Incandescent Lamp.
Magnet. See Wire, Insulated.
Molybdenum See Molybdenum.
Phosphor Bronze. See Phosphor Bronze.
Platinum. See Platinum.
Radio Bus. See Wire, Bare.
Scrapers. See Strippers.
Strippers. See Strippers.
Tungsten. See Filament, Incandescent Lamp.

WIRE, Bare

Armature Banding	See B
Copper Wire	See C
Iron Wire	See S
Phosphor Bronze	See B
Radio Bus Wire	See C
Resistance Wire	See R
Steel Wire	See S

Acme. See Alloy Metal Wire Co.
Alpha Wire Corp., 520 Broadway, New York.. C R ..
Advance. See Driver Harris Co.
Alloy Metal Wire Co., Meore, Pa. ..... C R ..
American Copper Products Corp., 233 Broadway, New York, N. Y. ..... C R ..
American Electrical Works (Phillipsdale), Providence, R. I. ..... C ...
American Insulated Wire, Div. of General Cable Corp., 954 W. 21st, Chicago ..... C .. S
American Steel & Wire Co., 208 S La Salle
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y. ..... C ...
Anylite Elec. Co., 200 Murray, Fort Wayne, Ind.. C ...
Atlantic Insulated Wire & Cable Co., Div. of General Cable Co., Rome, N. Y. ..... C ...
Ballast. See Gilby Wire Co.
Baltimore Copper Mills, Div. of Revere Copper & Brass, Inc., Baltimore, Md. ..... C ...
Bassett Metal Goods Co., Derby, Conn. (General Sales Agent, Hatheway & Co., 16 Hudson, New York, N. Y. C
Belden Mfg. Co., 4631 W. Van Buren, Chicago... C .. S
Beldenite. See Belden Mfg. Co.
Bradford, Kyle & Co., Plymouth, Mass. ..... R
Braidite. See Cornish Wire Co.
Brenvar. See American Insulated Wire & Cable Co.
Bridgeport Brass Co Bridgeport, Conn C
Calido. See Driver Harris Co.
Chase Brass & Copper Co., 236 Grand, Waterbury, Conn.
Chromel. See Hoskins Mfg. Co.
Chromic. See National-Harris Wire Co.
Climax. See Driver Harris Co.
Comet. See Driver Harris Co.
Cook Plate Co., Edw. N., 70 Ship, Providence, R. I. C ...
Copel. See Hoskins Mfg. Co.
Copperweld Steel Co., Glassport, Pa. ..... C .. S
Cornish Wire Co., 30 Church, New York, N. Y.. C ...
Cornwire. See Cornish Wire Co.
Crescent Ins. Wire & Cable Co., Trenton, N. J.. C ...
Cromin. See Gilby Wire Co.
Cromo. See Gilby Wire Co.
Detroit Insulated Wire Co., Div. of General Cable Corp., Detroit, Mich. ..... C ...
Duss. See Chicago Insulated Wire & Mfg. Co.
Driver-Harris Co., Harrison, N. J. ..... R ..
Electron. See Bassett Metal Goods Co.
Excellicor. See Branford Elec. Co.
Fullman Mfg. Co., Latrobe, Pa. ....
Gilby Wire Co., Riverside Ave., Newark, N. J. ..... S
Goldmark Co., James, 83 Warren, New York C ...
Hope Webbing Co., 1005 Main, Pawtucket, R. I. (Braided Wire Tape) ..... C ...
Hoskins Mfg. Co., 4435 Lawton Ave., Detroit, Mich. ..... R ..
Hudson Wire Co., Oswining, N. Y. ..... C R ..
Ideal. See Driver Harris Co.
Indiana Rubber & Insulated Wire Co., 620 W. Jackson Blvd., Chicago, Ill. ..... C .. S
Karma. See Driver Harris Co.
Keystone. See Fullman Mfg. Co.
Lucero. See Driver Harris Co.
Marion Insulated Wire & Rubber Co., Marion, Ind. C ...
Monel. See Standard Alloy Wire Co.
National-Harris Wire Co., Newark, N. J. ..... R ..
Nichrome. See Driver Harris Co.
Novar. See Standard Alloy Wire Co.
Page Steel & Wire Co., Bridgeport, Conn. ..... S
Peerless. See Alloy Metal Wire Co.
Phillips Wire Co., Div. of General Cable Corp., Pawtucket, R. I. ..... C ...
Phono-Electric. See Bridgeport Brass Co. & Standard Underground Cable Co.
Premier. See Alloy Metal Wire Co.
Providence Insulated Wire Co., Providence, R. I.. C ...
Race. See Rome Wire Co.
Revolute Wire Co., Hastings-on-Hudson, N. Y.... C ...
Rice Co., A. H., Pittsfield, Mass. ..... C ...
Roebling's Sons Co., John A., Trenton, N. J..... C .. S
Rome Wire Co., Div. of General Cable Co., Rome, N. Y. ..... C ...
Ross Wire Co., 60 Bath, Providence, R. I..... C ...
Seneca Wire & Mfg. Co., Fostoria, O. ..... S
Silicrimp. See Valley Narrow Fabric Co.
Silectron. See Standard Alloy Wire Co.
Solar. See Gilby Wire Co.
Spargo Wire Co., J. A., Rome N. Y. ..... C ...
Standard Alloy Wire Co., Div. of National-Harris Wire Co., Newark, N. J. ..... R S
Standard Underground Cable Co. (Div. of General Cable Corp.), Perth Amboy, N. J.
Super Insulated Wire Co., Plymouth, Mass. ..... C ...
Superior. See Alloy Metal Wire Co.
Talking Tape. See Hope Webbing Co.

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COMPANY
Wilbur B. Driver, Pres., Newark, N. J.

Therlo. See Driver Harris Co.
Tophet. See Gilby Wire Co.
Tru-Lay. See Page Steel & Wire Co.
Valley Narrow Fabric Co., Falls, R. I.
Wheeler Insulated Wire Co., Bridgeport, Conn.. C ...
WIRE CLOTH. See Cloth, Wire.

WIRE, Copper Clad

Copperweld Steel Co., Glassport, Pa.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Standard Underground Cable Co., Div. of General Cable Corp.), Perth Amboy, N. J.
WIRE SOLDER. See Solder, Bar and Wire.

WIRE DRAWING MACHINES

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American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Sleeper-Hartley, Inc., Worcester, Mass.
Torrington Manufacturing Co., 70 Franklin, Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, Ohio.
Wire Machinery Corp. of Am.. New Haven, Conn..

WIRE FORMING MACHINE

Seifert, E. R., 315 E. Washington, Syracuse, N. Y.

WIRE, Insulated

KEY

Annunciator, Office, Bell Wire	See A
Asbestos Covered Heater Cord	See H
Asbestos Covered Magnet Wire	See M
Enameled Magnet Wire	See M
Fixture Wire	See R
Flexible Reinforced Heavy Duty Cord	See F
Heater Cord	See H
Ignition Cable	See R
Lamp Cord	See R
Radio Cord	See R
Rubber Covered Wire & Cable	See R
Stove Wire	See H
Telephone Cord	See T

A-A Wire Co. (Div. of General Cable Corp), 420 Lexington Ave., N. Y. C.. R .....
A-1 Brand. See American Insulated.
Amelectric. See American Elec.
American Braiding Co., Holyoke, Mass. R .....
American Copper Products Corp., 233 Broadway, New York, N. Y. ....
American Insulated Wire Corp., 45 Baker, Providence, R. I. ..... R F .. A T ..
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill. ..... R F H A T ..
Americore. See American Steel.
Amerite. See American Steel.
Amerize. See American Steel.
Amparak. See American Steel.
Anaconda Wire & Cable Co., 25 Broadway, New York, N. Y. ..... R F .. A ....
Ansonia Electrical Co. Ansonia, Conn. (Silk Cotton Enameled) ..... A ....
Armorlokt. See American Steel.
Atlantic Insulated Wire & Cable Co., Div. of General Cable Co., Rome, N. Y. ..... R F H .. T ..
Bay State Insulated Wire & Cable Co., Paydras (Mattapan) 26, Boston ..... R .....
Belden Mfg. Co., 4631 W. Van Buren Chicago, Ill. ..... R F H A T ..
Birnbach Radio Co., 254 W. 31st, New York, N. Y. ..... R .....
Bishop Wire & Cable Corp., 420 E. 25th, New York, N. Y. ..... R F .....
Boston Insulated Wire & Cable Co., 65 Bay, Boston, Mass. ..... R F H .....
Cablex. See Collyer Insulated Wire Co.
Celatsite. See Acme Wire Co.
Collyer Insulated Wire Co., Pawtucket.. R F H .. ..
Colorbeston. See General Elec. Co.
Colorubber. See Belden Mfg. Co.
Condex. See Simplex Wire Co.
Contact Cable. See Bishop Wire & Cable Corp.
Copperweld Steel Co., Rankin, Pa..... R ..... T ..
Cotenamel. See Belden Mfg. Co.
Cottonite. See Acme Wire Co.
Crescent Braid, Inc., Providence, R. I..... H .....
Crescent Ins. Wire & Cable Co., Trenton. R F H A T ..
Crescord. See Crescent Ins. Wire & Cable Co.
Davis-Jones Insulated Wire Co., Pawtucket, R. I. ..... R F H A T ..
Deltabeston. See York Insulated
Detroit Insulated Wire Co., Div. of General Cable Corp., Detroit, Mich... R ..... T ..
Diamond Braiding Mills, Chicago Heights R F H .....
Di-Noburn. See Diamond Braiding Mill. delphia, Pa.
Dreadnaught. See Indiana Rubber Co.
Driver-Harris Co., Harrison, N. J..... R .. H .....
Ducatto. See Dudlo Mfg. Co.
Durabilt. See Anaconda Wire & Cable Co.
Duracord. See Anaconda Wire & Cable Co.
Durawire. See Anaconda Wire & Cable Co.
Duro. See McEvoy, C. H.
Eagle. See Goldmark Co., James.
Eastern Insulated Wire Co., Tilton, N. H. R .....
1885. See Chicago Insulated Wire.
Enamelite. See Acme Wire Co.
Enterite. See Rome Wire Co.
Fibrex. See Simplex Wire Co.
Flexible Woven Cable Co., 755 Boylston, Boston, Mass. ..... F .....
Flex-O-Cord. See Packard Elec. Co.
Garco. See General Asbestos Co.
Gavitt Mfg. Co., West Brookfield, Mass. ..... T ..
GE-Flex. See General Elec. Co.

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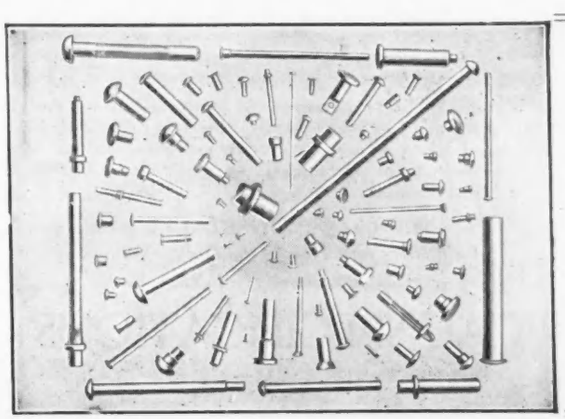

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WIRE FORMING MACHINES—Continued

General Asbestos & Rubber Co., Charleston, S. C. ..... H .....
General Elec. Co., Merchandise Dept., W325, Bridgeport, Conn. ..... R F H .....
Giant. See Collyer Insulated Wire.
Gilby Wire Co., Riverside Ave., Newark, N. J. ..... H .....
Globe Insulated Wire, 145 Old Colony Ave., Wollaston, Mass. ..... B .....
Goldmark Co., James, 83 Warren, New York, Annunciator and Asbestos, Cotton, Silk ..... A .....
Goodyear Rubber Insulating. See Graybar Electric Co.
Graybar Elec. Co., Graybar Bldg., Lexington Ave. & 43rd St., New York, N. Y. B ..... T ..
Grimshaw See New York Ins.
Hatex See Hatfield Rubber Wks.
Hatfield Rubber Wks., Inc., Hillside & Long Aves., Hillside, N. J. ..... R F H .. T ..
Hazacord. See Hazard Insulated Wire Works.
Hazard Insulated Wire Works, Div. of Okonite Co., Wilkes-Barre Pa. ..... H F .....
Holyoke Co., 621 Broadway, New York. B ..... A .....
Indiana Rubber & Insulated Wire Co., 620 West Jackson Blvd., Chicago, Ill... R F H .....
I. X. L. See Collyer Insulated.
Kable. See Safety Cable Co.
Kenrite. See American Insulated.
Kerite Ins. Wire Cable Co., 30 Church, New York, N. Y. ..... H .....
Kilo Co., 2 E. 23d, New York, N. Y. ..... T ..
Koelle, Frederick C., Real Estate Trust Bldg., Philadelphia, Pa. ..... T ..
Lowell Insulated Wire Co., Lowell, Mass. R F H .....
Liberty. See Nat. Elec. Products Corp.
Lorsteel. See Hazard Insulated Wire Works.
McEvoy, C. H., Lowell, Mass. ..... R ..... T ..
Marion Insulated Wire & Rubber Co., Marion, Ind. ..... R F H A T ..
Montgomery Co., J. R., Windsor Locks, Conn. ..... T ..
Nagy. See Bishop Wire & Cable Corp.
National Elec. Products Corp., Pittsburgh. H F H A T ..
National-Harris Wire Co., Newark, N. J. R .....
New England Elec. Wks., Lisbon, N. H.. R .....
N. E. See New England Elec. Wks.
New York Insulated Wire Co., 114 Liberty, New York, N. Y. ..... R .....
Nitro See Belden Mfg. Co.
O. K. See Phillips Wire Co. Also
Okocord. See Okonite Co.
Okonite Co., Passaic, N. J. ..... R .....
Ozex. See Simplex Insulated Wire
Packard Electric Co., Warren, O. ..... R F .....
Parac. See Phillips Wire Co.
Paracore. See U. S. Rubber Co.
Paraflex. See Bishop Wire & Cable.
Paranite. See Indiana Rubber.
Parkerite. See Seward Wire Co.
Peco. See Packard Elec. Co.
Philadelphia Insulated Wire Co., 200 N. Third, Philadelphia, Pa. ..... H A T ..
Phillips Wire Co., Div. of General Cable Corp., Pawtucket, R. I. ..... R .....
Providence Insulated Wire Co., Providence R F H A ..
Pyroproof. See Hatfield Rubber Works, Inc.
Raven Core. See New York.
Reliance See American Steel.
Riga. See Birnbach Radio Co.
Rockbestos Products Corp., 369 Nicoll, New Haven, Conn. ..... R .. H .. T ..
Roebling's Sons Co., John A., Trenton, N. J. ..... R F H A T ..
Rome Electrical Co., Inc., Div. of General Cable Corp., Rome, N. Y. ..... M
Rome Wire Co., Inc., Div. of General Cable Corp., Rome, N. Y. ..... R F H .. T ..
Ross Wire Co., 69 Bath, Providence, R. I.. R .....
Romoxide. See Rome Wire Co.
Ruffcoat. See Rome Wire Co.
Safety Cable Co. (Div. of General Cable Corp.), New York ..... R F H .....
Salamander. See York Insulated.
Seward Wire Co., Parkersburg, W. Va. R .....
Silkenamel See Belden Mfg. Co.
Silkenite See Acme Wire Co.
Simcore. See Simplex Wire.
Shield. See Ansonia Elec'l Co.
Simplex Wire & Cable Co., 201 Devonshire, Boston, Mass. ..... R F H .. T ..
Spiralweave. See Hazard Ins. Wire
Standard Alloy Wire Co., Div. of National-Harris Wire Co., Newark, N. J. ..... H .....
Standard Underground Cable Co. (Div. of General Cable), Perth Amboy, N. J. R F H A T ..
Sterling. See Standard Underground.
Sterling Insulated Wire Co., Fall River, Mass. ..... R .....
Super-Service. See Rome Wire Co.

Sweetstrand. See Strand & Sweet.
Tip-Top. See Standard Underground
Tirex See Simplex Wire & Cable.
Trenchlay See Rome Wire Co.
Triangle Conduit Co., Dry Harbor Rd. & Cooper Ave., Brooklyn..... B .....
Tubular Woven Fabric Co., Pawtucket, R. I. ..... R F .....
United States Rubber Co., 1790 Broadway New York, N. Y. ..... R .. H A T .
U. S. Royal. See United States.
Warrior See American Copper.
Wheeler Insulated Wire Co., Bridgeport, Conn. ..... R F H .. T ..
White, J. M., 1128 Olive, Philadelphia, Pa. ..... R F H .. T
Whitney Blake Co. See Graybar Electric Co.
Wovenite. See Flexible Woven.
York Insulated Wire Wks. of G. E. Co., 120 Broadway, New York, N. Y..... R .. H .....

WIRE, Magnet

Acme Wire Co., New Haven, Conn.
Alpha Wire Corp., 520 Broadway, New York, N. Y.
Amalac. See Direct Line Telephone Co.
American Electrical Works (Phillipsdale) Providence, R. I.
American Enameled Magnet Wire Co., Muskegon, Mich.
American Insulated Wire Div. of General Cable Corp., 954 W. 21st, Chicago, Ill.
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill.
Anaconda Wire & Cable Co., Maring Wire Branch, Muskegon, Mich.
Ansonia Electrical Co., Ansonia, Conn.
Belden Mfg. Co., 2310B S. Western Ave., Chicago, Ill.
Bradford, Kyle & Co., Plymouth, Mass. Essex, Paterson, N. J. ..... I .....
Celatsite. See Acme Wire Co.
Cotenamel. See Belden Mfg. Co.
Cottonite. See Acme Wire Co.
Crescent Ins. Wire & Cable Co., Trenton, N. J.
Ducatio. See Dudlo Mfg. Co.
Dudlo Mfg. Co. (Div. of General Cable Corp.), End of Wall, Fort Wayne, Ind.
Enamelite. See Acme Wire Co.
Fawcett, Hughes, Inc., 115 Franklin, New York, N. Y.
Goldmark Co., James, 83 Warren, New York, N. Y.
Holyoke Co., 621 Broadway, New York, N. Y.
Inland Wire & Cable Co., Sycamore, Ill.
Kilo Co., 2 E. 23rd, New York, N. Y.
Massachusetts Electric Mfg. Co., West Lynn, Mass.
National Electric Products Corp., Pittsburgh, Pa.
New England Electrical Works, Lisbon, N. H.
Revolute Wire Co., Hastings-on-Hudson, New York.
Rockbestos Products Corp., New Haven, Conn.
Roebling's Sons Co., John A., Trenton, N. J.
Rome Electrical Co., Rome, N. Y.
Rome Wire Co. (Div. of General Cable Corp.), Rome, N. Y.
Southern States Cable Co. (Div of General Cable Corp.), Mobile, Ala.
Strand & Sweet Mfg. Co., Winsted, Conn.
Sweetstrand. See Strand & Sweet Mfg. Co.
Varflex Co., Rome, N. Y.
Wheeler Insulated Wire Co., Bridgeport, Conn.
Winsted Insulated Wire Co., Winsted, Conn.
York Insulated Wire Wks. of G. E. Co., 120 Broadway, New York, N. Y.

WIRE MANUFACTURING MACHINES

(See Also Wire Drawing Machines; Insulation Mixers, Taping Machines, Wire; Wire Polishing Machines Enameling Machines for Magnet Wire; Wire Wrapping Machines; Vulcanizers, Wire Insulation.)

Armoring Machines ..... See A
Braiding Machines ..... See B
Bunching Machines ..... See S
Covering Machines ..... See I
Insulating Machines ..... See I
Insulation Straining Machines ..... See I
Measuring Machines ..... See M
Park Cabling Machines ..... See A
Saturating Tanks ..... See F
Spooling Machines ..... See U
Stranding Machines ..... See S
Tinning Tanks ..... See F
Winding Reels ..... See U

Adamson Machine Co., Akron, Ohio.. I A .....
Aimee-Seward. See American Insulating Machinery Co.
American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa. I A .... S U F
Breguet. See American Insulating
Crescent. See Royle & Sons, John.
Durant Mfg. Co., 662 Buffum, Milwaukee, Wis. ..... M .. U ..
Fidelity Machine Co., 3908 Frankford Ave., Philadelphia, Pa. ..... B .....
Housatonic Machine & Tool Co., Bridgeport, Conn. ..... I ..... U ..
Minneapolis Elec. & Construction Co., 80 S. 12th St., Minneapolis, Minn. ..... M .. U ..
Nebutteo. See New England Butt Co.
New England Butt Co., 324 Pearl, Providence, R. I. ..... I A B M S U ..
Peerless See Royle & Sons, John
Robertson Co., John, 121 Water, Brooklyn, N. Y. ..... A .....
Royle & Sons, John, Paterson, N. J I .....
Sleeper & Hartley, Inc., Worcester, Mass. ..... A .... S U
Terkelsen Machine Co., Terkelsen Bldg., Boston, Mass. ..... M .....
Textile Machine Works, Reading, Pa ... B .....
Universal Wire Machy. Co., 69 Daggett, New Haven, Conn. ..... A ..... U F
Utility Mfg. Co., Cudahy, Wis. ..... I .....
Wardwell Braiding Machine Co., Central Falls, R. I. ..... B .....
Watson Machine Co., 74 Railroad Ave., Paterson, N. J. ..... I .....
Wire Machinery Corp. of Am., New Haven, Conn. ..... M S U ..
Weir. See Housatonic Machine

WIRE POLISHING MACHINES

(See Also Wire Manufacturing Machines).

American Insulating Machinery Co., 519 Huntington Ave., Philadelphia, Pa.
New England Butt Co., 324 Pearl, Providence, R. I.

WIRE, Steel Flat

Steel Coating for Armored Conductor.
American Steel & Wire Co., 208 S. La Salle, Chicago, Ill.
Crescent Insulated Wire & Cable Co., Trenton, N. J.
Roebling's Sons Co., John A., Trenton, N. J.
Seneca Wire & Mfg. Co., Fostoria, O.

WIRE STRAIGHTENING MACHINES

Eisler Electric Corp., 770 S. 13th St., Newark, N. J.
Franklin Mfg. Co., New Haven, Conn.
Kane & Roach, Syracuse, N. Y.
Shuster Co., F. B., New Haven, Conn.
Seifert, E. R., 315 E. Washington, Syracuse, N. Y.

WIRE TAPING MACHINES. See Taping Machines, Wire.

WIRE VULCANIZING MACHINES. See Vulcanizers.

WIRE WRAPPING MACHINES

Terkelsen Machine Co., Terkelsen Bldg., Boston, Mass.

WOOD BLOCKS. See Cabinets & Boxes, Wood.

Boxes. See Cabinets & Boxes, Wood
Cabinets. See Cabinets & Boxes, Wood
Pulleys. See Pulleys, Composition
Woods Metal. See Radio Mountings.

WRAPPERS, Paper. See Boxes and Wrappers.

WRAPPERS, Tungsten Lamp. See Boxes and Wrappers.

YARN AND THREAD; Silk, Cotton, Asbestos

Allbestos Corp., 21st & Godfrey Ave. (Germantown), Philadelphia, Pa.
Ambler Asbestos Shingle & Sheathing Co., Ambler, Pa.
American Asbestos Co., Norristown, Pa.
American Glanzstopf Corp., 180 Madison Ave., New York.
Anchor Thread Co., Trenton (Grovesville), N. J.
Asbestos Fibre Spinning Co., North Wales, Pa.
Columbian Rope Co., Auburn, N. Y.
Commercial Rayon & Thread Co., 19 W. 21st, New York.
Ferodo & Asbestos, Inc., New Brunswick, N. J.
Florsheim, H. A., 225 Fifth Ave., New York, N. Y.
Franklin Rayon Corp., 86 Crary, Providence, R. I.
General Electric Co., Schenectady, N. Y.
Great Lakes Yarn & Thread Co., Div. of General Cable Corp., 5133 Wesson Ave., Detroit, Mich.
Johns-Manville Corp., New York, N. Y. (Asbestos.)
Kubar Mfg. Co., Davidson, N. C.
Lees Mfg. Co., 320 Broadway, New York, N. Y.
Multiple Winding Co., 77 Summer, Boston, Mass.
Rich & Co., H. S., 180 S. Water, Providence, R. I.
Ryle & Co., Wm., 381 Fourth Ave., New York, N. Y.
Silkslip. See Worcester Bleach & Dye Wks. Co.
Smith & Dove Mfg. Co., Andover, Mass. (Linen Thread.)
Worcester Bleach & Dye Wks., Worcester, Mass.

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Horse Head. See New Jersey Zinc Co.
New Jersey Zinc Co., 160 Front, New York, N. Y.
Platt Bros. & Co., Waterbury, Conn. (Strips.)
St. Joseph Lead Co., 250 Park Ave., New York, N. Y.
United Metals Selling Co., 25 Broadway, New York, N. Y

ZINCS AND COPPERS, Battery

Bunker Hill. See St. Joseph Lead Co.
Bunnell & Co., J. H., 215 Fulton, New York, N. Y.
Edes Mfg. Co., Plymouth, Mass.
Extruded Metal Corp., 184 53rd, Brooklyn, N.Y. (Zinc Cups.)
Franklin. See Grasselli Chemical Co.
Grasselli Chemical Co., Guardian Bldg., Cleveland, O.
Illinois Zinc Co., Peru, Ill.
Lind Mfg. Co 70 Wyckoff Ave., Brooklyn, N.Y. (Zinc Cups.)
Mattiessen & Hegeles Zinc Co., La Salle, Ill.
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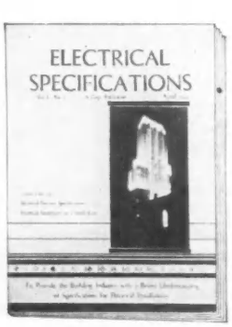
St. Joseph Lead Co., 250 Park Ave., New York, N. Y



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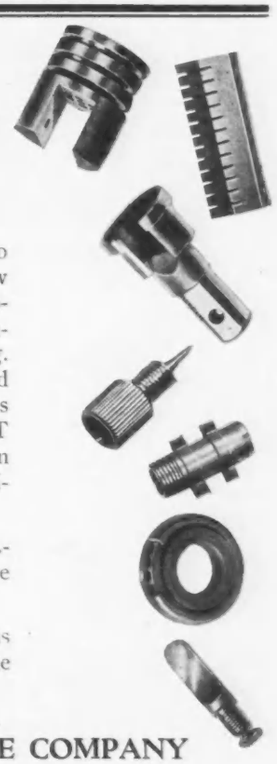

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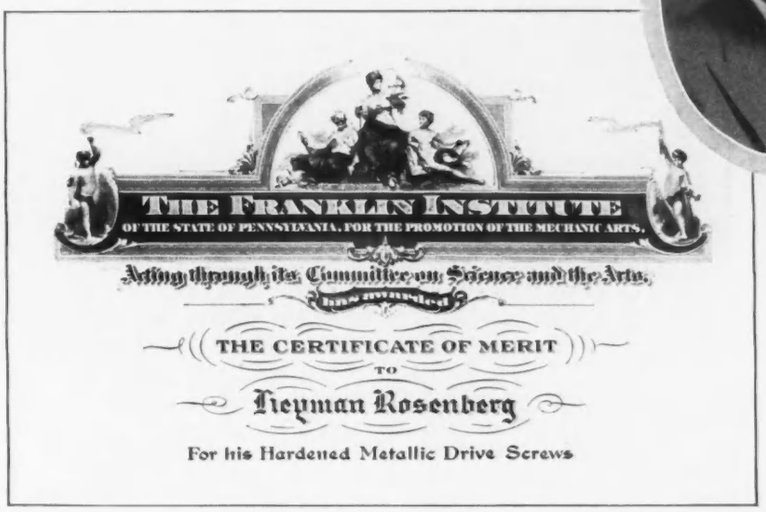
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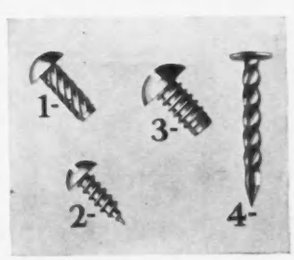

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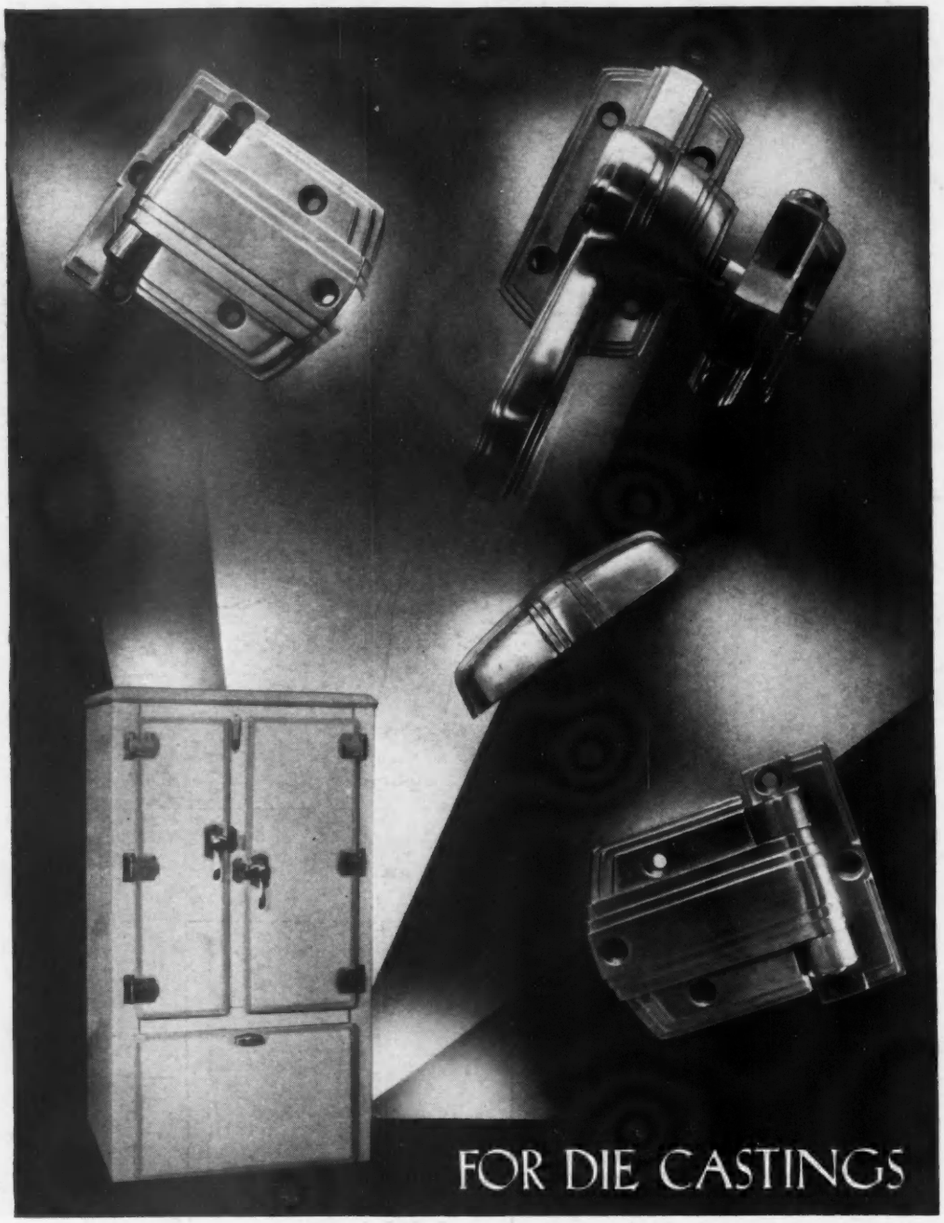

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